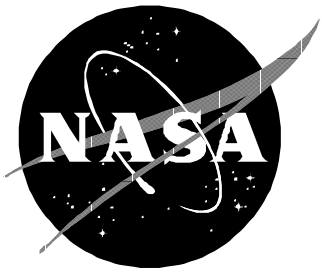

National Aeronautics and Space Administration

April 3, 2000
AO 00-OSS-XX

DRAFT

Announcement of Opportunity

Discovery Program

Notice of Intent Due: **XXX, 2000**
Proposals Due: **XXX, 2000**

FOREWORD

This document is a Discovery Program Announcement of Opportunity (AO) for two different types of Discovery Program investigations: Discovery Missions and Missions of Opportunity.

Section 1, Description of Opportunity, provides a brief introduction describing the scope of the solicitation, the two types of investigations that may be proposed in response to this AO, a summary of the selection process, and the schedule. Section 2, Discovery Program Goals, Objectives, and Background, and Section 3, Discovery Program Constraints, Guidelines, and Requirements, are applicable to both Discovery Mission investigations and Mission of Opportunity investigations. Section 4 describes Discovery Missions investigations and Discovery Mission-specific requirements. Section 5 describes Mission of Opportunity investigations and Mission of Opportunity-specific requirements. Section 6, Proposal Preparation and Submission, Section 7, Proposal Evaluation, Selection, and Implementation, and Section 8, Conclusion, are applicable to both Discovery Mission investigations and Mission of Opportunity investigations.

Proposers interested only in Discovery Mission investigations should read sections 1, 2, 3, 4, 6, 7, and 8 and any Appendices referred to in those sections.

Proposers interested only in Mission of Opportunity investigations should read sections 1, 2, 3, 5, 6, 7, and 8 and any Appendices referred to in those sections.

Proposers should be aware of changes in this AO from the previous Discovery AO. For Missions of Opportunity, these include an increase in the nominal cost cap (Section 5.4) and the inclusion of NASA missions (except those sponsored by the Office of Space Science) as Missions of Opportunity (Section 5.1). There are now additional requirements for Co-Investigators (Section 3.5). Inclusion of a Guest Investigator/Guest Observer program is now strongly encouraged (Section 3.2). The latter two changes apply to both Discovery investigations and Missions of Opportunity. There are additional requirements related to U.S. export laws and regulations (Section 3.7).

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1.0 Description of Opportunity

1.1 Introduction and Announcement Objectives

The National Aeronautics and Space Administration (NASA) announces the opportunity to conduct planetary science investigations through Discovery Program space flight missions that meet the goals of planetary system(s) exploration. For the purpose of this Announcement, the terms "planetary science" and "planetary system(s) exploration" encompass:

- The scientific objectives of the NASA Solar System Exploration theme, and
- The search for extrasolar planetary systems elements of the NASA Astronomical Search for Origins theme.

Discovery missions, therefore, are solar system science missions intended for travel to and exploration of solar system bodies, and/or for remote examination of the solar system and extrasolar planetary system environments. These themes are amplified in documents cited in Section 2.1. Additional information concerning these themes can be found on the Office of Space Science homepage at the World Wide Web URL address <http://spacescience.nasa.gov/>.

The strategic role of the Discovery Program is to address Space Science Enterprise science goals and objectives that are not addressed by missions explicitly included in the Space Science Enterprise Strategic Plan (see Section 2.1). Missions that are intended to achieve science goals of missions already in the Strategic Plan for a similar time period may not be proposed for consideration by this AO. For example, missions with science goals similar to those for the Pluto/Kuiper Express, Europa Orbiter, and Mars 2003 should not be proposed.

The Discovery Program is designed to accomplish frequent, high quality planetary system(s) science investigations utilizing innovative, streamlined, and efficient management approaches. It seeks to reduce total mission cost substantially and to improve performance through the use of new technology and through commitment to, and control of, design/development and operations costs, and to transfer new technology among space, nonaerospace firms, educational, other nonprofit organizations, and Government entities. It requires proposers to set goals for the participation of small disadvantaged businesses, women-owned small businesses, Historically Black Colleges and Universities, and other Minority Educational Institutions in proposed procurements. Finally, it seeks to enhance public awareness of, and appreciation for, space exploration and to incorporate Educational and Public Outreach (E/PO) activities into planetary system(s) science investigations.

Proposals to the Discovery Program require careful tradeoffs between science and cost to produce investigations with the highest possible science value for the cost. Investigations proposed at or near the cost cap may be selected only if the science is especially compelling. NASA is seeking program balance between lower and higher cost investigations that will allow a mission launch every 12 to 24 months within the Discovery funding profile. Accordingly, the NASA OSS Cost for all phases of the investigation, including mission launch services and the spacecraft, will be a determining factor in selection.

This AO invites proposals for investigations for the ninth Discovery Mission (and possibly the tenth), and for the execution of appropriate scientific investigations through participation in space missions that are sponsored by organizations other than the Office of Space Science, identified in this announcement as Missions of Opportunity.

Discovery Mission investigations are characterized as complete missions launched on Expendable Launch Vehicles or the Space Shuttle (see Section 4.1 for a description of launch options and restrictions). Proposals submitted in response to this AO for Discovery Mission investigations must be for *complete* investigations from project initiation (Phase A/B) through mission operations (Phase E), which is to include analysis and publication of data in the peer reviewed scientific literature and delivery of the data to the Planetary Data System (PDS). Proposals must be consistent with the criteria specified in this AO. Proposals that describe only portions of investigations (such as the provision of an instrument as part of a nondomestic mission) may, if appropriate, be proposed as Mission of Opportunity investigations. Approximately four to six Discovery Mission investigations will be selected under this AO and will be awarded contracts to conduct concept studies with options for the follow-on phases. NASA will review the results of the concept studies and intends to select one investigation for flight. However, NASA reserves the right to select and approve additional investigations for flight, based on funding availability and overall compelling scientific merit. Investigations not selected for concept study or flight may recompete for a future flight opportunity under a subsequent Discovery Program AO. Further information on Discovery Mission investigations is given in Section 4.0.

Mission of Opportunity investigations are characterized as being part of non-OSS space missions of any size, but having a NASA OSS Cost that is under $35 million in Fiscal Year 2001 dollars. These investigations are generally conducted on a no-exchange-of-funds basis with the organization sponsoring the mission. NASA intends to solicit proposals for Mission of Opportunity investigations with each future AO issued for the Discovery Program. For each AO, the cost limit for Mission of Opportunity investigations is expected to be constant, adjusted only for inflation.

Mission of Opportunity investigations may be undertaken through the Discovery Program when the perceived value is high and the proposed cost to NASA OSS is within the above funding limits. NASA, however, is not required to select a Mission of Opportunity investigation under this solicitation. Note that if a Mission of Opportunity investigation is selected, a reduced flight rate of Discovery Mission investigations is expected. The Discovery Program also expects Mission of Opportunity investigations to meet other program objectives for reducing cost, infusing and transferring new technology, and enhancing education and public outreach. Further information on Mission of Opportunity investigations is given in Section 5.0.

1.2 Proposal Evaluation and Selection Process

The selection process for this Discovery AO will be done in two phases.

- In phase one, selection of proposals submitted in response to this AO will be based principally on their scientific merit, as evaluated by peer review. In accordance with NASA's desire to fly missions as frequently as possible, the proposed cost to NASA OSS will also be an important selection criterion, but it will be given lower weight than scientific merit. The technical merit and feasibility of the scientific investigation; the feasibility of the mission implementation scheme; and the demonstrated commitment to education and public outreach, to technology infusion/transfer, and to participation of small, and small disadvantaged businesses are additional selection criteria. These criteria will be given still lower and approximately equal weights. It is anticipated that four to six Mission investigation proposals will be selected and awarded contracts as a result of this first phase. One or more Mission of Opportunity investigation proposals may also be selected; however, NASA is not required to make such a selection under this solicitation.

- Phase two begins with a four-month concept study conducted by each selected investigation team. Each concept study for Discovery Mission investigation will be funded up to $375K (real year dollars). Concept study funding for Mission of Opportunity investigations will be determined on a case by case basis; however, the funding will be limited to a maximum of $250K (real year dollars). At the end of the concept studies, NASA will conduct a detailed review to evaluate the implementing details of the selected investigations, namely, any modifications of the scientific objectives; the proposed cost to NASA OSS; design details of the experiment hardware; plans for mission implementation, including all technical and management factors; details of the education and public outreach programs; and plans for the infusion and transfer out of new technology (as appropriate). As a result of this second evaluation, one or more Discovery Mission investigations and possibly one or more Mission of Opportunity investigations will be selected for implementation leading to flight.

1.3 Proposal Opportunity Period and Schedule

NASA is seeking Discovery Mission investigations with a mission launch date no later than September 30, 2006; investigations with anticipated launch dates later than this should be proposed in response to a subsequent Discovery AO. However, proposed investigations with launch dates later than that date may be considered if there are sufficiently compelling reasons for them to be considered at this time.

NASA is also seeking Mission of Opportunity investigations through this AO where a commitment from NASA is needed by the sponsoring organization before December 31, 2001. The launch dates for these missions may be at any time. Missions of Opportunity requiring later commitment dates should propose in response to a subsequent Discovery Program AO.

The following schedule describes the major milestones for this Discovery Announcement of Opportunity:

AO release	April 3, 2000
Preproposal Conference	April 17, 2000
Notice of Intent due	XXX, 2000
Proposal due by 5 p.m. CDT	XXX, 2000
Nondomestic Letter of Endorsement due	August 3, 2000
Selections announced (target)	November 2000
Concept Study due (target)	March 2001
Downselection of investigations (target)	July 2001

2.0 Program Goals and Objectives

2.1 Planetary System(s) Exploration Goals

The scientific goals of planetary system(s) exploration within the Office of Space Science (OSS) are generally contained in *The Space Science Enterprise Strategic Plan: Origins, Evolution, and Destiny of the Cosmos and Life*, (November 1997). The goals in this plan are supported by the documents *Mission to the Solar System: Exploration and Discovery, A Mission and Technology Roadmap, 2000-2025*, (September 1996), the report of the Solar System Exploration Subcommittee, titled *Solar System Exploration 1995-2000,* and the report of the National Research Council's Committee on Planetary and Lunar Exploration, titled *An Integrated Strategy for the Planetary Sciences: 1995-2010.* The goals related to the search for extrasolar planetary systems in this plan are supported by *Search for Origins Roadmap* (April 1997), the Association of Universities for Research in Astronomy report *HST and Beyond, Exploration and Search for Origins: A Vision for Ultraviolet - Optical - Infrared Space Astronomy (May 1996),* and the report *Exploration of Neighboring Planetary Systems (ExNPS) (October 1995).* All of these documents are contained in the Discovery Program Library (see Appendix E). The scientific goals in these referenced documents as they relate to the scientific objectives of the NASA Solar System Exploration theme, and the search for extrasolar planetary systems element of the NASA Origins theme, (see Section 1.1) form the basis of the science evaluation criteria.

The goals and strategies outlined in the above documents encompass a wide range of scientific questions spanning a variety of scientific disciplines that NASA seeks to address by supporting investigations in three broad categories: (1) laboratory research and theoretical analyses, (2) ground-based astronomical observations, and (3) flight projects. The Discovery Program solicits only those investigations that fall into the third category. Investigations proposed to be accomplished as flight projects in the Discovery Program include, but are not limited to, remote observations from Earth-orbiting spacecraft, flyby and/or rendezvous/orbiter spacecraft, soft landers and/or penetrators, and sample return missions.

2.2 Discovery Program Objectives

Principal Goal: Perform frequent, high-quality scientific investigations that assure the highest science value for cost.

By conducting a series of planetary systems science investigations at the highest value for cost, NASA will provide a mechanism by which the most pressing questions in planetary systems science may be addressed, permitting a steady improvement in our understanding of planetary systems and the processes that affect them. The frequent, steady nature of the investigations will assure a continuing stream of fresh scientific data to the planetary systems science community, thus helping to maintain the excellence of the U.S. planetary systems science program.

Supporting Objective 1: Pursue innovative ways of doing business.

The short development schedule and low costs associated with Discovery demand innovative business and management practices. NASA's approach to Discovery investigations encourages teaming arrangements among industry, university, and/or Government partners. Competitively selected teams will have the responsibility and authority to accomplish the entire mission. This will permit them to utilize innovative approaches necessary to stay within the strict cost and schedule limits of the program. NASA oversight and reporting requirements will be limited to only that which is essential to assure science investigation success in compliance with committed cost, schedule, performance, reliability, and safety requirements.

Supporting Objective 2: Encourage the use of new technologies to achieve program objectives and foster their transfer into the private sector.

The inclusion of new technologies to achieve performance enhancements and to reduce total mission cost is encouraged in Discovery proposals. Proposals that include new technologies should pay especially careful attention to technology development plans and/or risk mitigation approaches. The use of new technologies will enable more aggressive and exciting scientific objectives to be pursued. The teaming of industry, university, and Government is meant to foster an environment conducive to technology development, utilization, and commercialization.

Supporting Objective 3: Enhance general public awareness of, and appreciation for, planetary system(s) exploration and support the Nation's educational initiatives.

Contributing to the improvement of science education and the public understanding of science are goals of the Discovery Program and of the Office of Space Science as a whole. The Discovery Program is committed to incorporating program elements directed toward informing the public and providing educational opportunities that support local, state, regional, and national educational objectives and reform efforts.

3.0 Discovery Program Constraints, Guidelines, and Requirements

This section describes the constraints, guidelines, and requirements applicable to all Discovery Program selections. Additional options, guidelines, and requirements specific to Discovery Missions investigations are in Section 4. Additional constraints, guidelines, and requirements specific to Mission of Opportunity investigations are in Section 5. Specific directions for proposal preparation are included in Section 6 and in Appendix B. For investigations selected in phase one, specific guidance relative to the concept study preparation is contained in a document in the Discovery Program Library (DPL) entitled *Guidelines for Concept Study Report Preparation* (see Appendix E).

3.1 General Program Constraints and Guidelines

In the Discovery Program, the major responsibility for the selected investigation rests with the investigation team, which will have a large degree of freedom to accomplish its proposed objectives within the stated constraints with only essential NASA oversight. Once an investigation has been selected for flight, failure to maintain reasonable progress on an agreed upon schedule or failure to operate within the constraints outlined in this section may be cause for its termination by NASA.

Every aspect of a Discovery investigation must reflect a commitment to mission success while keeping total costs as low as possible. Consequently, investigations should be designed and scoped to emphasize mission success within cost and schedule constraints by incorporating sufficient cost, schedule, and design margins, reserves, and content resiliency.

Only those investigations whose proposed cost, design/development schedule, and launch vehicle requirements are within the constraints and guidelines identified herein will be considered as candidates for selection. Investigations significantly below the cost and launch vehicle constraints are encouraged to enable more frequent and, therefore, diverse Discovery Program missions.

Discovery investigation teams must be led by a single Principal Investigator (PI) who may be from any category of domestic and nondomestic organizations, including educational institutions, industry, nonprofit institutions, NASA Centers, the Jet Propulsion Laboratory (JPL), and other Government agencies.

Teaming arrangements among universities, industry, nonprofit institutions, and/or Government agencies (both foreign and domestic) are encouraged. Teams are encouraged to utilize industry participation to the fullest extent reasonable. NASA field centers and the Jet Propulsion Laboratory are welcome as Discovery mission team members. However, when a NASA field center or JPL participates as a member of a Discovery mission team, it should do so because it brings unique skills, facilities, and/or capabilities to the team.

3.2 Science Requirements

The Discovery Program is intended to perform focused planetary system(s) science investigations. The relationship between the scientific objectives, the data to be returned, and the instrument payload to be used in obtaining the desired data must be unambiguous and clearly stated. Discovery investigation teams will be responsible for initial analysis of the data, its subsequent delivery to the Planetary Data System (PDS), and the publication of scientific findings and communication of results to the public. (Information on the PDS, its formats, and its requirements is included in the Discovery Program Library (DPL) discussed in Section 6.1.1.). Options for extended missions are not to be included in proposals to this AO.

The strategic role of the Discovery Program is to address science goals and objectives that are not addressed by missions explicitly included in the Space Science Enterprise Strategic Plan (see Section 2.1 and Appendix E). Investigations that are intended to achieve science goals of missions already in the Strategic Plan for a similar time period are *not* within the scope of this AO. For example, missions with science goals similar to those for the Pluto/Kuiper Express, Europa Orbiter, and Mars 2003 should not be proposed. All other science objectives and targets within planetary system(s) exploration are within the scope of this AO.

Any samples of extraterrestrial planetary materials returned by Discovery missions shall be delivered to the NASA astromaterial curatorial facility located at NASA's Johnson Space Center (JSC); contact Dr. Douglas Blanchard, Acting Astromaterial Curator at (281) 483-5151. Costs for use of this facility should be included in the NASA OSS Cost**.** Investigation teams will be responsible for all aspects of the delivery of such materials to the astromaterial curatorial facility. This facility will be given the task of providing for the physical security, inventory accountability, environmental preservation, and distribution of the samples in support of scientific research programs organized around each mission. For every Discovery mission investigation in which extraterrestrial planetary materials are returned to Earth, the JSC astromaterial curatorial facility will perform sample processing in support of the mission science team. The science team shall be allocated no more than 25 percent (by mass) of the returned sample unless a larger fraction can be fully justified by the nature of the proposed investigation. The remainder shall be kept in pristine condition for research by the community at large.

NASA strongly encourages the addition of Guest Investigators (GI's)/Guest Observers (GO's) to broaden the mission's scientific impact. (See Section 7.2.1c.) The cost of implementing a GI/GO program is to be borne by the investigation.

There shall be no proprietary data rights period for Discovery investigations. Discovery teams will be responsible for collecting the scientific, engineering, and ancillary information necessary to validate and calibrate the scientific data prior to delivery to the PDS. Data products delivered to the PDS shall be calibrated in physical units useable by the scientific community at large. The time required to complete this process should be the minimum necessary to provide appropriate data to the scientific community and the general public. Investigation teams must include an appropriate data analysis period independent of the PDS archiving activities as a part of their funded Phase E activities.

3.3 Education, Public Outreach, Technology, and Small Disadvantaged Business Requirements

The education, outreach, technology, and small disadvantaged business requirements encompass the areas described in the three following subsections.

3.3.1 Education and Public Outreach

OSS expects education and public outreach to be a significant part of each OSS flight program and research discipline, and strongly encourages space science researchers to engage actively in education and public outreach as an important component of their NASA-supported professional activities. In order to achieve this goal, OSS has developed a comprehensive approach for making education at all levels (with a particular emphasis on K-14 education) and the enhancement of public understanding of space science integral parts of all of its missions and research programs. The three key documents that establish the basic policies and guide all OSS Education and Public Outreach activities are a strategic plan entitled *Partners in Education: A Strategy for Integrating Education and Public Outreach Into NASA's Space Science Programs* (March 1995), an accompanying implementation plan entitled *Implementing the Office of Space Science (OSS) Education/Public Outreach Strategy* (October 1996), and the *Explanatory Guide to the NASA Office of Space Science Education and Public Outreach Evaluation Criteria* (April 1999). These documents are available through the Discovery Program Library (see Appendix E) or, alternatively, can be accessed by selecting "Education and Public Outreach" from the menu on the OSS homepage at the World Wide Web address <http://spacescience.nasa.gov>, or may be requested from Dr. Jeffrey Rosendhal, Office of Space Science, Code S, NASA Headquarters, Washington, DC 20546-0001.

In accord with these established OSS policies, Education and Public Outreach (E/PO) will be an integral element of the Discovery Program, and 1-2% of the NASA OSS Cost (excluding launch vehicles) will be allocated to education and outreach.

Instructions for the E/PO component of the proposal are contained in Appendix B.

See Appendix C for a detailed discussion of evaluation criteria for E/PO proposals. Appendix C also provides information on the assistance available to develop E/PO proposals.

3.3.2 Technology

NASA seeks to infuse new technologies into its programs and to strengthen the mechanisms by which it transfers such technologies to the private sector, including the nonaerospace sector. The means by which NASA's Office of Space Science plans to implement new technology is described in *The Space Science Enterprise Integrated Technology Strategy* (October 1998), which is included in the DPL described in Section 6.1.1. The Discovery Program represents an opportunity for NASA to develop and test new technologies and applications, as well as strengthen existing technology transfer mechanisms and explore and implement new mechanisms

and approaches to economic benefit. However, investigations dependent on new technology must have adequate backup plans defined for use in the event that the new technology runs into problems and will not be ready prior to assembly and test of the spacecraft. Investigations dependent on new technology will not be penalized for risk provided that adequate plans are described to provide a reasonable back-up approach that will assure the success of the investigation.

3.3.3 Small Disadvantaged Business and Minority Institutions

The PI and team members shall agree to use their best efforts to assist NASA in achieving its goal for the participation of small disadvantaged businesses, women-owned small businesses, Historically Black Colleges and Universities, and other Minority Educational Institutions in NASA procurements. Investment in these organizations reflects NASA's commitment to increase the participation of minority concerns in the aerospace community, and it is to be viewed as an investment in nation's future. Offerors, other than small business concerns, are also advised that contracts resulting from this AO will be required to contain a subcontracting plan that includes goals for subcontracting with small, small disadvantaged, and women-owned small business concerns. See Appendix A, Section XIII for information on goals and subcontracting plan requirements.

3.4 Technical Approach Requirements

Discovery projects must encompass all technical aspects of the investigation from preliminary analysis and technical definition (Phase A/B) through delivery of the data to the PDS and their analysis (the final part of the operations phase, Phase E). The document, NPG 7120.5A *NASA Program and Project Management Processes and Requirements,* delineates activities, milestones, and products typically associated with each of these phases and may be used as a reference in defining a team's mission approach. This document is included in the DPL (see Section 6.1.1). Mission teams have the freedom to use their own processes, procedures, and methods, and the use of innovative processes is encouraged when cost, schedule, and technical improvements can be demonstrated.

Each investigation shall have a cost-effective mission assurance program. This program should include a quality assurance program that is consistent with the ISO 9000 series, American National Standard, *Quality Systems - Model for Quality Assurance in Design, Development, Production, Installation, and Servicing,* ANSI/ASQC Q9001-1994 (see Appendix E).

Radioisotope Thermoelectric Generators (RTG's) are <u>not</u> permitted on Discovery missions proposed to this AO. Other, smaller radioactive sources (such as radioactive heating units or instrument calibration sources) are permitted. However, since such usage will require, as a minimum, an environmental assessment (See Environmental Quality Regulations, 40 CFR Parts 1500-1508 in Appendix E, DPL), proposers should minimize the quantity of radioactive material employed. As a general rule, as the quantity of radioactive material increases, the likelihood increases that an environmental impact statement, with the attendant schedule and cost risks, will be required.

Investigation teams are welcome to use currently available NASA navigation, tracking, control, communications, and other services. Non-NASA capabilities may also be used if they are technically appropriate and cost effective. The costs for such services, whether obtained from NASA or from other sources, must be included in the cost estimate. Cost information for NASA provided services (*NASA's Mission Operations and Communications Services*) is provided in the DPL (See Appendix E).

3.5 Management Requirements

NASA intends to give the Principal Investigator and his/her team the ability to use their own management processes, procedures, and methods to the fullest extent possible. Discovery investigation teams should define the management approach best suited for their particular teaming arrangement. This approach should be commensurate with the investigation's implementation approach**,** while retaining a simple and effective management structure that assures adequate control of development within the cost and schedule constraints. The investigation team should develop a Work Breakdown Structure (WBS) that best fits its organizational approach and mission design concept.

The PI is expected to be the central person in charge of each Discovery investigation, with full responsibility for its scientific integrity. The PI is responsible for assembling a team to propose and implement a Discovery investigation. The PI is accountable to NASA for the scientific success of the investigation and must be prepared to recommend project termination when, in the judgment of the PI, the successful achievement of established minimum science objectives, as defined in the proposal as the Performance Floor, is not likely within the committed cost and schedule reserves.

In accordance with NASA's transfer of program management responsibility to its Centers, Discovery mission program management responsibilities have been assigned to the NASA Management Office (NMO) at the Jet Propulsion Laboratory. The responsibilities of the Discovery Program Manager in the NMO will include mission implementation oversight; coordination of Government-furnished services, equipment, and facilities; and contract management of selected investigations. In addition, the Discovery Program Manager will conduct independent reviews coincident with the major project reviews, such as preliminary design review or the critical design review.

Each Discovery investigation must have a Project Manager (PM) who will oversee the technical implementation of the project. The role, qualifications, and experience of the PM should be adequate to ensure that the technical and managerial needs of the investigation will be met.

Every Discovery investigation must also define the risk management approach it intends to use to ensure successful achievement of the investigation objectives within established resource and schedule constraints. Included in this discussion of risk management should be risk mitigation plans for new technologies and the need for any long-lead items that need to be placed on a contract before the start of Phase C/D, to ensure timely delivery. In addition, any manufacturing, test, or other facilities needed to ensure successful completion of the proposed investigation should be identified in every Discovery proposal.

3.5.1 Co-Investigator Roles and Requirements

A Co-Investigator is defined to be an investigator who plays a necessary role in the proposed investigation and whose services are either funded by NASA or are contributed. If funded by NASA, costs must be accounted for in the NASA OSS Cost. If contributed, the costs must be accounted for in the Total Mission Cost and an endorsement letter from the proposed Co-Investigator's institution must be provided with the proposal. The role of each Co-Investigator must be described in the proposal. Other nonfunded members of the proposal team may be included in the proposal as collaborators. See Appendix B for details.

3.6 Cost Requirements

3.6.1 NASA OSS Cost

A major goal of designing a Discovery investigation is to reach a balance between science return and NASA OSS cost in order to provide the highest science value for cost. The NASA OSS Cost is the funding that NASA OSS would be expected to provide to the investigation team over the course of the investigation, beginning with the selection and ending with the conclusion of Phase E. The specific funding limits and limits for major mission elements are specified in Sections 4.5 and 5.4 for Discovery and Missions of Opportunity, respectively. Proposers must estimate both the total mission cost (TMC) and the NASA OSS Cost in both the proposal and the concept study. The NASA OSS Cost will be one factor in the selection of missions and in the continuing assessment of ongoing missions. The specific cost information required for the proposals is contained in Appendix B. Cost information required for the concept study for selected proposals is given in the document *Guidelines for Concept Study Report Preparation* available from the Discovery Program Library (see Appendix E).

Since cost details are not anticipated until the conclusion of the concept study, cost estimates in the proposal may be generated with models or cost estimating relationships from analogous missions. However, the proposed cost to NASA OSS shall not increase by more than 20% from the proposal to the concept study and must not exceed the Discovery Program cost constraints. Since costs and obligation authority may well be different, it is incumbent on the proposer to define any obligation requirement that exceeds planned costs.

Once established at the end of the concept study, the estimated cost baseline must assure adequate funding to meet cost-to-complete requirements, including the identification of credible, phased reserves proportional to the development risk. The Discovery Program does not maintain a reserve pool from which investigations exceeding their cost commitments may draw.
The TMC is defined as all costs that are necessary to complete the investigation incurred after the downselection from the concept studies, which includes all costs in Phases A/B through E, including reserves, contributions, and contract fees. In general, proposers should assume all costs must be included unless specifically excluded. Examples of costs to be included are: launch vehicles and any upper stages; launch services; education and outreach activities; new technology

infusion and transfer; subcontracting costs (including fees); science teams; all personnel required to conduct the investigation, analyze and publish results, and deliver data in archival format to the PDS; insurance; NASA Deep Space Network (DSN) support, if required (see *NASA's Mission Operations and Communications Services* document in the DPL, Appendix E); Navigation and Ancillary Information Facility (NAIF) services; NASA curatorial support (if required; see Section 3.2); and all labor (including contractor and Civil Servant).

3.6.2 Full Cost Accounting

Where NASA-provided services are used, NASA Civil Service labor and supporting NASA Center infrastructure must be costed on a full cost accounting basis. If NASA guidance for full cost accounting has not been fully developed by the closing date for proposal submission or for completion of the concept studies, NASA Centers may submit full cost proposals based on the instructions in the NASA Financial Management Manual, Section 9091-5, Cost Principles for Reimbursable Agreements (see Appendix E). If any NASA costs are to be considered as contributed costs, the contributed item(s) must be separately funded by an effort complementary to the proposed investigation, and the funding sources must be identified. Other Federal Government elements of proposals must follow their agency cost accounting standards for full cost. If no standards are in effect, the proposers must then follow the Managerial Cost Accounting Standards for the Federal Government as recommended by the Federal Accounting Standards Advisory Board.

3.6.3 Contributions

Contributions of any kind, whether cash or noncash (property and services), to Discovery investigations by organizations other than the Office of Space Science are welcome. Values for all contributions of property and services shall be established in accordance with applicable cost principles. Such contributions may be applied to any part or parts of a mission. A letter of endorsement that provides evidence that the institution and/or government officials are aware and supportive of the proposed investigation and will pursue funding for the investigation if selected by NASA must be submitted with the proposals for all U.S. components. For non-U.S. components of proposals, see Section 3.7.

The cost of contributed hardware should be estimated as either: (1) the cost associated with the development and production of the item if this is the first time the item has been developed and if the mission represents the primary application for which the item was developed; or (2) the cost associated with the reproduction and modification of the item (i.e., any recurring and mission-unique costs) if this is not a first-time development. If an item is being developed primarily for an application other than the one in which it will be used in the proposed investigation, then it may be considered as falling into the second category (with the estimated cost calculated as that associated with the reproduction and modification alone).

The cost of contributed labor and services should be consistent with rates paid for similar work in the offeror's organization. The cost of contributions does not need to include funding spent before the start of the investigation (before completing a contract with NASA). The value of materials and supplies shall be reasonable and shall not exceed the fair market value of the property at the time of the contribution. Contribution funding limitations are defined in section 4.4.

3.7 International Participation

Recognizing the potential scientific, technical, and financial benefits offered to all partners by international participation, participation by non-U.S. individuals and organizations as team members in Discovery Program investigations is encouraged. Participation may include, but is not limited to, the contribution of scientific instruments, the spacecraft (or a portion thereof) and the subsequent sharing of the data from the mission, all on a no-exchange-of-funds basis. Launch vehicles and launch services may also be contributed by international partners but, unlike other contributions, are not subject to the "one-third" limit described in Section 4.4. However, they should be included in all calculations and discussions of the total mission costs.

The direct purchase of goods and/or services from nondomestic sources is permitted with the following restriction: NASA will not purchase non-U.S. launch vehicles for Discovery missions, nor may funds provided to a Discovery mission team be used to purchase a launch vehicle from a non-U.S. source. The provision of launch services as a contribution to a Discovery mission by a nondomestic partner is acceptable only on a no-exchange-of-funds basis (i.e., at no cost to NASA). Only those nondomestic launch vehicles with demonstrated reliabilities of 90% or greater may be proposed.

Potential Discovery participants are advised that a contract or subcontract using funds derived from NASA by a U.S. team with a non-U.S. participant must meet NASA and Federal regulations. These regulations place an additional burden on investigation teams that should be explicitly included in discussions of the investigation's cost, schedule, and risk management. Information regarding regulations governing the procurement of foreign goods or services is provided in Appendix D.

Proposers should be aware that investigations that include international participation, either through involvement of non-U.S. nationals and/or involvement of non-U.S. entities must include in their proposal a section discussing compliance with U.S. export laws and regulations; e.g., 22 CFR 120-130, *et seq*. and 15 CFR 730-774, *et seq*., as applicable to the scenario surrounding the particular international participation. The discussion must describe in detail the proposed international participation and is to include, but not be limited to, whether or not the international participation may require the prospective proposer to obtain the prior approval of the Department of State or the Department of Commerce via a technical assistance agreement or an export license, or whether a license exemption/exception may apply. If prior approvals via licenses are necessary the proposal must discuss whether the license has been applied for or if not, the

projected timing of the application and any implications for the schedule. Information regarding U.S. export regulations is available through Internet URLs http://www.pmdtc.org and http://www.bxa.doc.gov. Prospective proposers are advised that under U.S. law and regulation, spacecraft and their specifically designed, modified or configured systems, components, parts, etc., such as the instrumentation being sought under this AO, are generally considered "Defense Articles" on the United States Munitions List and subject to the provisions of the International Traffic in Arms Regulations, 22 CFR 120-130, *et seq*.

Participation by nondomestic individuals and/or institutions as team members or contributors to Discovery investigations must be endorsed by the institutions and governments involved. The Letter of Endorsement will provide evidence that the institution and government officials are aware and supportive of the proposed investigation and will pursue funding for the investigation if selected by NASA. The endorsement must be submitted per the schedule in Section 1.3.

4.0 Discovery Mission Investigations Options, Guidelines, and Requirements

Discovery mission proposals must be for complete, free-flying missions. The Principal Investigator (PI) is responsible to NASA not only for the scientific integrity of the investigation, but also for the management of the complete mission, including provision of the spacecraft, instrument, and ground system. Such missions may be launched on expendable launch vehicles or the Space Shuttle as free flying spacecraft.

4.1 Discovery Mission Options

Expendable Launch Vehicle Option

Proposals are for complete missions that are launched using expendable launch vehicles (ELV's) either as primary, secondary, or co-manifested payloads. ELV's may either be provided by NASA with NASA funding or by the proposer as a contribution. Launch services will be provided by NASA only for a medium class (Delta II 7925H) or smaller expendable launch vehicle (see Discovery Launch Services Information Summary document in the Discovery Program Library, Appendix E). Larger launch vehicles can be proposed if they are contributed at no cost to NASA as part of a teaming proposal. The launch service costs of the Delta II 7925H or smaller expendable launch vehicle will be funded by NASA and its cost is to be included in the NASA OSS cost. However, it is not to be considered within the $190 million design/development cap (see Section 4.5).

Further discussions of the ELV launch option are in Section 4.5 with detailed information contained in the *Discovery Launch Services Information Summary* document listed in Appendix E and contained in the Discovery Program Library.

NASA seeks to take advantage of all reasonable sources of commercial ELV services while assuring that NASA-funded payloads are not exposed to excessive risk. The demonstrated reliability of the proposed launch vehicle and the resultant probability of mission success will be evaluated by NASA and factored into the feasibility of mission implementation evaluation

criteria (see Section 7.2). If the opportunity is as a secondary payload on an ELV, the proposer must identify the secondary opportunity and provide evidence that the launch service provider agrees to manifest the investigation as part of the proposal. If the investigation is selected, NASA expects to contract with the U.S. launch service provider to acquire the launch service for the investigation.

It is the responsibility of the proposer to find an organization that will contribute a launch if a contributed launch is part of the proposal. The demonstrated reliability and the resultant probability of mission success will be evaluated as described above for both contributed launch services and NASA funded launch services. The use of non-U.S. provided launch services may be proposed only on a no-exchange-of-funds basis.

Space Shuttle Free Flyer Option

Use of the Space Shuttle may be proposed only if use of its unique capabilities will result in enhanced science return or are necessary for mission success. The request for a Shuttle launch must demonstrate compliance with Space Shuttle Use Policy set forth in Public Law 101-611 (see appropriate excerpts in *Discovery Space Shuttle Launch Opportunities* document in the Discovery Program Library/Appendix E). The Principal Investigator is responsible for working with the point(s) of contact identified in the *Discovery Space Shuttle Launch Opportunities* document to determine if the investigation is considered a primary or secondary payload and to identify an appropriate flight assignment.

4.2 Baseline Mission and Performance Floor

Every Discovery mission investigation must have both a "Baseline" mission and a "Performance Floor." The Baseline mission refers to that mission that, if fully implemented, will accomplish the entire set of scientific objectives proposed for the investigation. Any alteration that results in a reduction of the mission's ability to accomplish the Baseline set of scientific objectives as identified in the proposal will be considered a descoping of the investigation. The resulting set of achievable scientific objectives must be reviewed to ensure that the investigation remains at or above the Performance Floor. The Performance Floor is the minimum science component below which the investigation will not be considered justified for the proposed cost. The Performance Floor must be identified and documented for each proposed Discovery investigation along with plans for the prioritized descoping of mission capability from the Baseline to the Performance Floor in the event of cost or schedule growth. The differences between the Baseline Mission and the Performance Floor will be assessed to determine the mission's resiliency in the event that development problems lead to reductions in scope. In addition, the mission team will negotiate a set of performance metrics during the definition phase for program evaluation, including cost, schedule, and others as appropriate. Failure to maintain a level of science return at or above the Performance Floor as determined by NASA will be cause for termination of the investigation.

4.3 International Participation

Any proposed international participation must be described at the same level of detail as that of U.S. partners. This includes the provision of full cost, schedule, and management data in the proposal and in subsequent reviews. Failure to document cost and schedule data, management approaches and techniques, or failure to document the commitment of all team partners to those costs and schedules, may cause a proposal to be found unacceptable.

4.4 Contributions

Contributions of any kind, whether cash or noncash (property and services) to Discovery mission investigations by organizations other than the Office of Space Science are welcome, but the sum of contributions to a given mission should not exceed approximately one-third (1/3) of the proposed cost to the Office of Space Science for the Phase C/D development (See Section 4.5 below). Values for all contributions of property and services shall be established in accordance with applicable cost principles. Such contributions may be applied to any part or parts of a mission, and will not be charged against the NASA OSS design/development cost-cap of $190 million (see Section 4.5), but must be included in the calculation and discussion of the total mission costs. A Letter of Endorsement that contains a statement of financial commitment from each responsible organization contributing to the investigation must be submitted with the proposals for all domestic components. For nondomestic components of proposals, see Section 3.7. This Letter of Endorsement is required to assure NASA that all contributions can and will be provided as proposed.

4.5 Cost and Schedule Requirements

The Discovery Program is part of an effort to develop a program of frequent, successful, small planetary system(s) investigations. The schedule for investigations selected through this AO is expected to be such that launch can take place by September 30, 2006. The proposer must specify the launch date and indicate launch date flexibility (if any) in the proposal.

The Discovery Program is also intended to provide a mechanism to accomplish important scientific investigations within a short time, so the schedule for all Discovery missions must be such that the launch takes place within 35 months from the start of the design/development phase (Phase C/D). Note that Phases A and B have been combined into a single phase ending approximately one month after preliminary design review. The design/development phase is defined as ending 30 days after launch, so the maximum permissible length of any Discovery mission Phase C/D is 36 months. No constraint is placed on the length of Phase A/B or Phase E. Procurement of long-lead materials is permitted during the Phase A/B timeframe, but should be shown as a Phase C/D task and, therefore, as a Phase C/D cost. The Phase C/D long-lead procurement overlap with Phase A/B will not be considered when determining the length of Phase C/D.

4.5.1 NASA OSS Cost

The Discovery program is also part of an effort to develop space science investigations of modest scope. To this end, NASA OSS will limit its funding for Discovery missions, including all mission phases and the launch vehicle, to $299M (FY2001 dollars). Further, NASA OSS will limit its funding for of Discovery mission development - costs incurred from the start of Phase C/D to launch plus 30 days - to $190M (FY2001 dollars). The NASA OSS funding profile available for missions selected under this AO is given in Appendix G.

Although NASA plans to fund directly the costs for U.S. launch services, these costs are nonetheless to be included in the proposal. Launch services may also be proposed at no cost to NASA as part of a teaming proposal.

For NASA provided ELV's, the ELV launch services cost to be used to calculate the NASA OSS Cost for an investigation using an ELV is provided in the *Discovery Launch Services Information Summary* document available in the Discovery Program Library.

If launch services using the Space Shuttle are proposed, the launch services costs should include mission unique and upper stage(s) cost, if any, and integration costs. The cost of completing development of a carrier, if such a carrier will be used for the first time, should be included under spacecraft cost. Conditions and cost for use of this option are discussed in the *Discovery Space Shuttle Launch Opportunities* document available in the DPL (see Appendix E).

The specific cost information required for Discovery mission proposals is contained in Appendix B.

4.5.2. Total Mission Cost

The Total Mission Cost is defined as <u>all</u> costs that are necessary to complete an investigation beginning with selection through Phase E, including NASA OSS costs, other NASA costs, non-NASA civil servant costs, and contributions from U.S. and non-U.S. entities. In general, proposers should assume all costs must be included unless specifically excluded.

Contributions, that is, goods and/or services offered on a no-exchange-of-funds basis, may be to any mission element, but the total contribution is not to exceed one-third of the proposed Phase C/D NASA OSS cost.

Proposers must estimate the Total Mission Cost in the proposal as described in Appendix B, Table B1. The Total Mission Cost, including contributions, may exceed the NASA OSS Cost.

4.6 Selection and Cost Limits

It is anticipated that four to six Discovery Mission investigations will be selected for a four month concept study through this AO, with each awarded a contract with options for subsequent mission phases. At the conclusion of the concept study, it is planned that one or more investigations will be selected to proceed into subsequent mission phases. NASA will not exercise contract options nor continue funding for those investigations not selected to proceed.

A concept study will be conducted by each selected investigation team. The cost (up to $375K in real year dollars) of the concept study should be part of the initial proposal. See the *Guidelines for Concept Study Preparation* available in the Discovery Program Library for information on the concept study to be conducted by the investigation team.

During the concept study, the NASA OSS cost shall not increase by more that 20% from that offered in the original proposal and, in any event, must not exceed the NASA OSS cost cap of $299 million (Fiscal Year 2001 dollars). Each mission's concept study must conclude with a commitment by the PI for the cost, schedule, and scientific performance of the investigation. If, at any time, the cost, schedule, or scientific performance commitments appear to be in jeopardy, the investigation will be subject to cancellation. The Discovery Program does not maintain a reserve pool from which investigations exceeding their cost commitments may draw.

5.0 Mission of Opportunity Investigations Background, Constraints, Guidelines, and Requirements

5.1 Missions of Opportunity Background and Constraints

By funding U.S. participation in Missions of Opportunity, NASA seeks to allow the U.S. scientific community to take advantage of missions planned and primarily funded as part of non-OSS space programs. Typically such missions are sponsored by non-U.S. governments, although missions from other U.S. agencies or private sector organizations are equally qualified. Mission of Opportunity investigations on a military satellite are allowed so long as the satellite is not planned for weapons testing.

For Missions of Opportunity, the proposer offers to participate in a non-OSS mission that is planned or that has been approved by its sponsoring organization. Such participation could take many forms, such as providing a complete science instrument, hardware components of a science instrument, or expertise in critical areas of the mission. While the U.S. investigator is not required to document the entire mission of the sponsor, the investigator must fully document their complete investigation in the proposal. NASA will evaluate the proposed investigation, not the sponsor's entire mission.

Note that selection by NASA through this AO does not constitute selection of the investigation as part of the mission, which necessarily is a decision made by the sponsor of the mission. Instead, selection is a commitment by NASA to fund the U.S. portion of the investigation as part

of the Discovery Program, although funding beyond basic studies does not begin until detailed design of the mission itself is underway. If an investigation is selected both by NASA and by the mission sponsor, the PI is responsible to NASA for the scientific integrity and the management of the PI's contribution to the mission.

A selected investigation may result in a contract, a grant, or a cooperative agreement, depending on the nature of the proposal and the institutions involved. For this AO, a deviation is granted by the NASA Office of Procurement that allows a commercial firm that proposes a Mission of Opportunity investigation to be awarded a grant (with no requirement for NASA involvement in and contribution to the technical aspects of the investigation) provided that the commercial firm contributes at least 50% of the total resources required to accomplish the effort. Further information on grants and cooperative agreements is contained in NASA Handbook NPG 5800.1D, entitled, *Grant and Cooperative Agreement Handbook*, dated July 1996, available from the Discovery Program Library (see Appendix E).

A selected Mission of Opportunity investigation will be expected to submit a concept study report to NASA for detailed review. This report will conclude with a commitment by the PI for the cost, schedule, and scientific performance of the investigation. If, at any time, this commitment appears to be in jeopardy, the investigation will be subject to cancellation regardless of the impact of this cancellation on its "parent" mission. Like other missions proposed to this AO, the NASA funding is subject to cancellation if there is a cost overrun charged to NASA for any reason, including a launch delay caused by the non-NASA partner.

A technical and programmatic review will be held prior to the start of phase C/D. Assuming a positive outcome, NASA will confirm the investigation to proceed to development. As a condition for confirmation, the organization sponsoring the full mission must make a commitment to enter into an appropriate agreement with NASA that shall include provisions for sharing of flight data.

5.2 General Guidelines for Missions of Opportunity

Missions of Opportunity are generally conducted on a no-exchange-of-funds basis between NASA OSS and mission sponsors. They are always conducted on a no-exchange-of-funds basis with a non-U.S. mission sponsor.

5.3 Science Requirements

Mission of Opportunity investigation teams will have data analysis responsibilities defined by the policies of the mission sponsor; nevertheless, NASA expects that the mission sponsor will enter into an agreement with NASA to assure that data returned from at least those aspects of the mission in which NASA support is involved, if not the entire mission, will be made available to the U.S. scientific community in a timely way.

5.4 Cost and Schedule Requirements for Missions of Opportunity

It is incumbent on the proposing investigator to provide evidence in his/her proposal that the sponsoring organization intends to fund the mission and that the endorsement of NASA for U.S. participation is required by the sponsoring organization prior to December 31, 2001. The launch date is not constrained. If a commitment from NASA is not needed by the sponsoring organization before December 31, 2001, then the proposal should be submitted to a subsequent Discovery Program AO.

Although the level of funding available for each proposal will be decided on a case-by-case basis, proposers should be aware that any Mission of Opportunity investigation costing the Discovery Program more than $35 million in fiscal year 2001 dollars will be difficult to support (this includes all phases of the investigation). NASA's funding for a selected investigation's concept study will be limited to $250K (in real year dollars). Follow-on work prior to selection by the mission's sponsoring organization will be limited to $100K (in real year dollars), and the limit for all studies prior to the initiation of mission detailed design (Phase C) is 25% of the total NASA commitment for funding of the investigation. The PI assumes all risk for delays in the mission and should propose appropriate reserves.

Proposers must estimate the total NASA OSS Cost in the proposal. The specific cost information required for proposals is contained in Appendix B.

During the concept study, the NASA OSS cost shall not increase by more than 20% from that offered in the original proposal and must not exceed the NASA OSS cost caps. Thereafter, cost shall not increase from that offered in the proposal resulting from the concept study.

Each mission’s concept study must conclude with a commitment by the proposer for the cost, schedule, and scientific performance of the investigation. If, at any time, the cost, schedule, or scientific performance commitments appears to be in jeopardy, the investigation will be subject to cancellation. The Discovery Program does not maintain a reserve pool from which investigations exceeding their cost commitments may draw.

6.0 Proposal Preparation and Submission

6.1 Preproposal Activities

6.1.1 Discovery Program Library

The Discovery Program Library (DPL) is intended to provide additional background, technical, and management information, and requirements. Information is included on the Discovery Program, science goals, launch vehicles, Deep Space Network capabilities, NASA's technology transfer infrastructure, the Office of Space Science’s Integrated Technology Strategy, the Office of Space Science’s Education and Public Outreach Strategy, the PDS, and existing NASA test

and mission operations facilities. Proposal information requested or suggested in these reference documents provide examples of data that assist evaluators in better evaluating proposals. In any case of conflict between the AO and these documents, however, the AO takes precedence. The contents of the DPL are listed in Appendix E. This library is accessible on the World Wide Web at the URL <http://discovery.larc.nasa.gov/discovery/dpl.html>.

If necessary, hard copies of selected documents may be obtained by written request to Dr. Jay Bergstralh at the address below**.**

6.1.2 Technical and Scientific Inquiries

Inquiries should be directed to Dr. Jay Bergstralh at the following address:

Dr. Jay Bergstralh
Research Program Management Division
Office of Space Science
Code SR
Ref. Discovery 00
National Aeronautics and Space
Administration
Washington, DC 20546-0001

Fax Number: (202) 358-3097
E-mail: jay.bergstralh@hq.nasa.gov
(note: subject field should read “DISCAO”)

6.1.3 Preproposal Conference

A preproposal conference will be held on the date shown in Section 1.3 at:

TBD

All interested parties may attend, but only at their own expense and they must make their own travel arrangements. The purpose of this conference will be to address questions about the proposal process for this AO. The preproposal conference will address all those questions received by NASA up to five days in advance of the conference. Questions should be addressed to Dr. Jay Bergstralh at the address given in Section 6.1.2. Additional questions submitted after this date, including those provided in writing at the conference, may be addressed at the conference only as time permits. Anonymity of the authors of questions will be honored. A Discovery AO Preproposal Conference Transcript, including answers to all questions addressed at the conference and minutes of the conference, will be prepared and mailed approximately two (2) weeks after the conference to attendees, to those submitting letters of intent (see Section 6.1.4), and to anyone who submits a request for this document to Dr. Jay Bergstralh via fax or electronic mail.

6.1.4 Notice of Intent to Propose

To assist NASA's planning of the proposal evaluation process, a Notice of Intent to Propose should be submitted by all prospective proposers in accordance with the schedule in Paragraph 1.3. Those submitting a Notice of Intent will directly receive program updates as may occur up to the time of proposal due date. This Notice is to be submitted electronically by entering the requested information on the site at the World Wide Web address <http://TBD/>. Proposers without access to the Web or who experience difficulty in using this site should contact TBD by E-mail at TBD or by phone at TBD for assistance.

To the extent the following information is known by the due date, the Notice of Intent should include:

(a) Name, address, telephone number, fax number, E-mail address, and institutional affiliation of the Principal Investigator (PI).

(b) Full names and institutional affiliations of each of the Co-Investigators (Co-I's). If any Co-Investigators or other team members are from nondomestic institutions, the mechanism by which these people will be funded should be identified in the comments box on the form.

(c) Mission mode (Discovery Mission or Mission of Opportunity) and anticipated Launch Vehicle.

(d) A brief statement (150 words or less) for each of the following:

(1) The scientific objectives of the proposed mission.

(2) Identification of new technologies that may be employed as part of the mission.

(3) The Education/Public Outreach objectives in the proposed investigation.

In addition, to the extent the following information is known by the due date, the Notice of Intent <u>should</u> include the name of the Lead Representative from each organization (industrial, academic, nonprofit, and/or Federal) included in the team.

Material in a Notice of Intent is for NASA planning purposes only and is confidential.

SPECIAL NOTICE: As a result of recent AO's for complete mission investigations, such as this one, commercial aerospace and technology organizations have requested access to the names and addresses of those who submit NOI's in order to facilitate informing potential proposers of their services and/or products. As an experiment and at the option of the submitters of a NOI, NASA

OSS is willing to offer this information with the understanding that the Agency takes no responsibility for the use of such information. Therefore, all those submitting an NOI in response to this AO are requested to include the appropriately edited form of the following material (Note: this material is included in the format of the NOI for those submitting electronically via the World Wide Web):

> "By submitting this Notice of Intent to propose, I hereby do / do not authorize NASA to post my name and institutional address (but not the name of my intended proposal) as an addendum to this AO on the World Wide Web starting approximately one week after the NOI due date. If I do authorize such a posting, I understand that such information will be in the public domain, and I will not hold NASA responsible for any use made by others for revealing this information."

6.2 Format and Content of Proposals

General NASA guidance for proposals to this AO is given in Appendix A, which is considered binding unless specifically amended in this AO. A uniform proposal format is required from all proposers to aid in proposal evaluation. The required proposal format and contents are summarized in Appendix B. Failure to follow this outline may result in reduced ratings during the evaluation process and could lead to rejection of the proposal without review. General information and further proposal preparation information are provided as Appendices to this AO.

6.3 Submission Information

6.3.1 Certification and Commitment Signatures

All proposals must have a Cover Page and Proposal Summary that is to be submitted electronically through the Web site given in Appendix B. Once the form is submitted, it must be printed and used to obtain the required Principal Investigator and institutional signatures. The Cover Page must be signed by an official of the PI's institution authorized to certify institutional support and sponsorship of the investigation, and the management and the financial parts of the proposal. The proposal shall include a letter of endorsement signed by an institutional official from each known partner and each organization expecting to provide critical, no-exchange-of-funds contributions of hardware, software, facilities, services (including Co-Investigator services), etc., that provides evidence that the institution and/or government officials are aware and supportive of the investigation and will pursue funding if selected by NASA. Paper copies of proposals and the original, signed version must be received by the due dates specified in Section 1.3 of this AO.

Signatures of commitment are required for all science team members identified in the science section (including the PI and CO-I's) and for all named key project personnel. These signatures are to be included at the bottom of the resume required for each of these individuals (see Appendix B, Section I.3. The resumes with the original signatures are to be included in the original copy of all proposals.

Non-U.S. organizations must additionally submit such endorsements to:

Discovery Support Office
Lunar and Planetary Institute TBD
3600 Bay Area Boulevard
Houston, TX 77058-1113
FAX: (281) 486-XXXX

by the due date given in the schedule in Section 1.3.

Unlike previous Discovery program solicitations, the authorizing institutional signature on the printout of the electronically submitted cover now also certifies that the proposing institution has read and is in compliance with the three required certifications printed in full in Appendix F. Therefore, it is not necessary to separately submit these certifications with the proposal.

6.3.2 Quantity

All proposers must provide 35 copies of their proposal, including the original signed proposal, on or before the proposal deadline.

6.3.3 Submittal Address

All proposals must be received at the following address by the proposal due date given in Section 1.3

Discovery Science Peer Review Panel
Lunar and Planetary Institute TBD
3600 Bay Area Boulevard
Houston, TX 77058-1113
Phone: (281) 486-2166 (for contact in case of commercial delivery service)

Additionally, one copy (over and above the 35 copies) of any proposal that includes any nondomestic participants, nondomestic letters of endorsement, and/or institutional and governmental commitments should be sent to Ms. Wavalene Barnes at the address given in Section 6.3.1.

6.3.4 Deadline

All proposals must be received at the address above by the closing date specified in Section 1.3. All proposals received after the closing date will be treated in accordance with NASA's provisions for late proposals (see FAR Supplement 1815.412, Paragraphs a and b in Appendix E/DPL).

6.3.5 Notification of Receipt

NASA will notify the proposers that their proposals have been received. Proposers not receiving this confirmation within two weeks after submittal of their proposals should contact Dr. Jay Bergstralh at the address given in Section 6.1.2.

7.0 Proposal Evaluation, Selection, and Implementation

7.1 Evaluation and Selection Process

All proposals will be subjected to a preliminary screening to determine their responsiveness to this AO. Proposals that are not in compliance with the constraints, requirements, and guidelines of this AO will be considered unacceptable and returned to the proposer. The remaining proposals will then be assessed by an evaluation team composed of panels of individuals who are peers of the proposers in scientific, technical, and other areas. The evaluations will be done in accordance with the criteria specified in Section 7.2.

After these evaluations, the panels will meet to consider the total qualitative and/or quantitative aspects of the evaluations to integrate the separate panel results, as necessary, to assure consistency and fairness in evaluations. Once these evaluations have been completed and integrated, an *ad hoc* Subcommittee of the Space Science Steering Committee (SScSC; see further below), composed entirely of Civil Servants who have served on the panels, will convene to consider the peer review results. This Committee will review all results and, based on this information, it will then categorize proposals in accordance with the category definitions in NASA FAR Supplement 1872.403, as follows:

> Category I. Well conceived and scientifically and technically sound investigations pertinent to the goals of the program and the AO's objectives and offered by a competent investigator from an institution capable of supplying the necessary support to ensure that any essential flight hardware or other support can be delivered on time and that data can be properly reduced, analyzed, interpreted, and published in a reasonable time. Investigations in Category I are recommended for acceptance and normally will be displaced only by other Category I investigations.
> Category II. Well conceived and scientifically or technically sound investigations which are recommended for acceptance, but at a lower priority than Category I.
> Category III. Scientifically or technically sound investigations which require further development.
> Category IV. Proposed investigations which are recommended for rejection for the particular opportunity under consideration, whatever the reason.

The results of the evaluations and categorizations will be presented to the Space Science Steering Committee (SSSC), composed of Civil Service personnel appointed by the Associate Administrator for Space Science (OSS), for an independent review of the evaluation and categorization processes. After this review, the final evaluation results will be forwarded to the

Associate Administrator, who will make the selection(s). Those proposers not selected will be notified by letter and will be offered a debriefing. Proposers selected will be notified by telephone and by letter, which will provide instructions concerning the steps necessary to finalize their contracts and conduct their concept studies.

The Associate Administrator for Space Science may use a wide range of planning and policy considerations when selecting among top proposals. Proposers should recognize that the Office of Space Science program planning is an evolving activity, dependent upon Administration policies and budgets, as well as planetary exploration objectives and priorities that can change quickly with time. The Office of Space Science develops and evaluates the program strategy in consultation with the scientific community directly and via advisory groups such as NASA's Solar System Exploration Subcommittee (SSES), Origins Subcommittee (OS) and the National Academy of Sciences' Committee on Planetary and Lunar Exploration (COMPLEX).

7.2 Evaluation Criteria

Successful implementation of the Discovery Program requires, in addition to scientific merit, that the investigations be achievable within established boundary conditions of cost and schedule. The evaluation approach is designed to determine the mission with the best combination of quality of science, likelihood that the proposed science investigation can be achieved, low cost, and contribution to broader NASA and space science goals. To accomplish these objectives, Appendix B requests specific information that will be used to establish the scientific merit of the investigation, the feasibility of the science investigation, the feasibility of implementing the mission, the cost for each proposal, and the value of the contribution to broader NASA goals.

7.2.1 Evaluation Criteria for Proposals

The evaluation criteria and their percentage weights, given in parenthesis, are:

- The scientific merit of the investigation (30),
- The NASA OSS cost (20),
- The technical merit and feasibility of the science investigation (20),
- The feasibility of the implementation scheme (20),
- Quality of plans for education and public outreach (5),
- Quality of plans for technology and small disadvantaged businesses (5)

7.2.1a Scientific Merit of the Investigation

The science information requested in the proposal will be used to evaluate each investigation for its scientific merit. To evaluate the intrinsic scientific merit, the investigation goals and objectives will be compared with the planetary system(s) science community's latest recommendations to determine the impact of the mission on science as a whole and, in particular, on the U.S. planetary system(s) science program (see goals in Section 2.1). This evaluation will include how well the mission fills important knowledge gaps or provides for fundamental progress in a subdiscipline, whether or not it provides ancillary benefits to science, and/or how well the mission may support or overlap ongoing missions. For Discovery Mission investigations, the scientific value of the Performance Floor (see Section 4.2) will also be assessed as part of the determination of the overall scientific merit of the investigation. This evaluation will result in descriptive text as well as a numerical and/or adjectival score of the scientific merit of the investigation.

7.2.1b NASA OSS Cost

Although it will be weighted less than the scientific merit, the proposed cost to NASA OSS will be a significant consideration in the evaluation of the proposals. As noted below, an assessment of the feasibility of completing the investigation within the estimated cost (i.e, realism of cost) will be part of the evaluation of feasibility of mission implementation.

7.2.1c Technical Merit and Feasibility of the Science Implementation

Each investigation will be evaluated for its technical merit, feasibility, resiliency, and the probability of success. Technical merit and feasibility will be evaluated by assessing the degree to which the investigation will address the proposed scientific goals and objectives and the degree to which the instrument set can provide the necessary data. Considerations in the evaluation of the data analysis and archiving plan include an assessment of planning and budget adequacy and evidence of plans for well-documented, high level products and software usable to the entire science community. Consideration of whether the data gathered will be sufficient to complete the scientific investigation will be a factor in this assessment. Other major elements include the proposed plan for the timely release of the data to the public domain and inclusion of a Guest Investigator Program (GIP) or Guest Observer Program (GOP) for enlarging science impact. Note that such GIP's or GOP's may be initiated no earlier than Phase E, must be fit within the NASA OSS Cost cap, and that NASA reserves the right to solicit and select all participants in such programs. For Discovery Mission investigations, resiliency will be evaluated by assessing the approach to descoping the Baseline Mission to the Performance Floor in the event that development problems force reductions in scope. The probability of success will be evaluated by assessing the experience, expertise, and organizational structure of the science team and the technical risk associated with the mission design and the instrument set. The role of each Co-Investigator will be evaluated for necessary contributions to the proposed investigation. This evaluation will result in a number and/or adjective score of the technical merit and feasibility of the scientific investigation.

7.2.1d Feasibility of the Mission Implementation Scheme

For all investigations submitted through this solicitation, the technical and management approaches will be evaluated to assess the likelihood that the investigation can be implemented as proposed. This will include an assessment of risk of completing the investigation within the proposed cost. The evaluation will consider implementation factors such as the proposed launch vehicle including reliability, mission design, spacecraft design, and design margins, and the proposers' understanding of the processes, products, and activities required to accomplish development and integration of all elements (flight systems, ground and data systems, and etc.). It will also consider the adequacy of the proposed approach, the organizational structure, the roles and experience of the known partners, the management approach, the commitments of partners and contributors, and the team's understanding of the scope of work (covering all elements of the mission, including contributions). The relationship of the work to the project schedule, the project element interdependencies, and associated schedule margins will also be evaluated. Investigations proposing new technology will be penalized for risk if adequate backup plans to ensure success of the mission are not described. The proposal must discuss the methods and rationale (cost models, cost estimating relationships of analogous missions, and etc.) used to develop the estimated cost, and must include a discussion of cost risks. Innovative cost effective features, processes, or approaches will be rewarded if proven sound.

It is recognized that teaming arrangements for implementing the mission may not be complete before the proposal closing date. Therefore, proposers will not be penalized if the proposal indicates only candidate (but credible) implementation approaches for the spacecraft, launch vehicle, communications, and ground systems that will allow successful implementation of the mission.

Since Mission of Opportunity investigations fly on non-OSS missions, factors involving spacecraft and launch vehicle capabilities will be considered in the evaluation only as appropriate.

Based on the items described above, each proposal will be evaluated as either high, medium, or low risk.

7.2.1e Quality of Plans for Education and Public Outreach

All proposed investigations must include an Education/Public Outreach component as part of their proposal. The criteria to be used to evaluate the E/PO component and a discussion of those criteria is given in the document *Explanatory Guide to the NASA Office of Space Science Education and Public Outreach Evaluation Criteria* (April 1999) which may be found by linking through the Education and Public Outreach Web site at the URL http://spacescience.nasa.gov. See Section 3.3.1 and Appendix C for further details on the E/PO requirements.

7.2.1f Quality of Plans for Technology and Small Disadvantaged Businesses

The new technology plan will be reviewed to determine the extent to which it meets the requirements given in section 3.3.2. Proposers should address how developmental problems with new technology will be addressed in order to ensure mission success.

The small disadvantaged business plan will be evaluated to determine the extent to which it meets the requirements given in section 3.3.3, including the mandated 8% participation goal.

7.3 Implementation Activities

7.3.1 Notification of Selection

Following selection, the PI's of the selected investigations will be notified immediately by telephone, followed by formal written notification. The formal notification will include any issues noted during the evaluation that may require resolution, and any other special instructions for the concept study. Proposers of investigations that were not selected will be notified in writing and offered oral debriefings for themselves and a representative from each of their main partners (if any).

7.3.2 Contract Administration and Funding

Different mission management approaches and organizational arrangements will require different contract administration and funding arrangements. Each PI, in his or her proposal, is expected to recommend, as part of the teaming arrangement, the organizations and contract mechanisms NASA should use in awarding work to the team. Cost type contracts with incentives are strongly encouraged, particularly where performance incentives are measured based on delivery of calibrated/validated science data products. It is anticipated that contracts will be awarded for concept studies for the four to six missions selected as a result of this AO, with options for the follow-on mission phases (Phase A/B, Phase C/D, and Phase E).

NASA will provide approximately $375K to each selected Discovery Mission investigation and up to $250K for each Mission of Opportunity investigation to perform a four-month concept study, to be initiated as soon as possible after notification. The product of these studies will be reports to be delivered on the date specified in Section 1.3. The contents and format of the concept study reports are specified in a document in the Discovery Program Library entitled *Guidelines For Concept Study Report Preparation* (See Appendix E/DPL). NASA may request presentations and/or site visits to review the concept study results with the investigation teams. The concept studies are intended to provide NASA with more definitive information regarding the cost, risk, and feasibility of the investigations before final selection(s) for implementation. As a result of evaluation of the concept studies, NASA expects to downselect to one or more investigations to proceed to Phase A/B by exercising contract options of the selected investigation(s). In no case, however, is NASA required to exercise any option.

7.3.3 Downselection of Investigations

The downselection decision will be made by the Associate Administrator for Space Science, based upon review of the concept study results and current programmatic considerations. The criteria presently being considered for evaluating the concept study are described in a document in the Discovery Program Library entitled *Concept Study Evaluation Criteria*. The scientific, technical, management, cost, and other aspects of the concept study will be assessed by a panel composed of individuals who are experts in each of the areas to be evaluated. The evaluation of the concept study for each investigation will be similar to the proposal evaluation, but will consider the additional detailed information provided. The evaluation will include a reexamination of the scientific merit of the investigation should any modifications be introduced as a result of the concept study, the total cost to NASA, the technical merit and feasibility of the science investigation, and the feasibility of implementing the mission. A complete assessment of the technical approach, the management, the Phase A/B plans, and the cost risk will be integrated to evaluate the probability that the implementation approach will support the science objectives. In addition, an evaluation of education, outreach, technology, and small disadvantaged business plans will be completed.

7.3.4 Confirmation of Investigations for Subsequent Phases

At the completion of the Phase A/B study (i.e., at the Preliminary Design Review), an independent review team will conduct a Confirmation Assessment. Based on the results of this review, the Associate Administrator for Space Science will decide whether or not to confirm the mission for design/development (Phase C/D). This decision will be based upon review of the Phase A/B results and programmatic considerations.

7.4 Selection Factors

As described in Section 7.1, the results of the proposal evaluations based on the criteria above and categorizations will be considered in the selection process.

Proposers to this AO should recognize that the program of the Office of Space Science is an evolving activity that critically depends upon Administration policies and budgets, as well as Space Science objectives and priorities, any of which may change quickly. Therefore, it is incumbent upon the Associate Administrator for Space Science to use all relevant science planning, policy, and cost considerations when making selection(s) among top ranked proposals submitted in response to this AO.

The overriding consideration for the final selection of proposals submitted in response to this AO will be to maximize scientific return within the available budget. Depending on the availability of proposals of appropriate merit, this objective may be achieved by the selection of an investigation at the cost ceiling for Discovery investigations, or a larger number of lower cost investigations, or a combination of investigations, including Missions of Opportunity, of various costs.

8.0 Conclusion

The Discovery Program continues to represent a challenging new way for NASA to accomplish important scientific exploration of planetary systems. It provides an opportunity for frequent flights to execute science investigations at the forefront of planetary system(s) science, as well as generate opportunities to enhance education initiatives and engage the public in the excitement of science discoveries. NASA invites both the U.S. and international science communities to participate in proposals for Discovery mission investigations and Mission of Opportunity investigations to be carried out as a result of this Announcement.

Alan N. Bunner
Science Program Director
Structure and Evolution of the Universe

Carl B. Pilcher
Science Program Director
Solar System Exploration

Anne L. Kinney
Science Program Director
Astronomical Search for Origins
and Planetary Systems

George L. Withbroe
Science Program Director
The Sun-Earth Connection

Edward J. Weiler
Associate Administrator
for Space Science

APPENDIX A

GENERAL INSTRUCTIONS AND PROVISIONS

I. INSTRUMENTATION AND/OR GROUND EQUIPMENT

By submitting a proposal, the investigator and institution agree that NASA has the option to accept all or part of the offeror's plan to provide the instrumentation or ground support equipment required for the investigation, or NASA may furnish or obtain such instrumentation or equipment from any other source as determined by the selecting official. In addition, NASA reserves the right to require use of Government instrumentation or property that subsequently becomes available, with or without modification, that meets the investigative objectives.

NOTICE TO ALL OFFERORS: In the event that a Principal Investigator employed by NASA is selected under this Announcement of Opportunity (AO), NASA will award prime contracts to non-Government participants, including co-investigators, hardware fabricators, and service providers, who are named members of the proposing team, as long as the selecting official specifically designates the participant(s) in the selection decision. Refer to Section J of Appendix B of this AO for proposal information which the selecting official will review in determining whether to incorporate a non-Government participant in the selection decision. Each NASA contract with hardware fabricators and service providers selected in this manner will be supported by an appropriate justification for other than full and open competition, as necessary.

II. TENTATIVE SELECTIONS, PHASED DEVELOPMENT, PARTIAL SELECTIONS, AND PARTICIPATION WITH OTHERS

By submitting a proposal, the investigator and the organization agree that NASA has the option to make a tentative selection pending a successful feasibility or definition effort. NASA has the option to contract in phases for a proposed experiment, and to discontinue the investigative effort at the completion of any phase. NASA may desire to select only a portion of the proposed investigation and/or that the individual participates with other investigators in a joint investigation. In this case, the investigator will be given the opportunity to accept or decline such partial acceptance or participation with other investigators prior to a NASA selection. Where participation with other investigators as a team is agreed to, one of the team members will normally be designated as its leader or contact point. NASA reserves the right not to make an award or cancel this AO at any time.

III. SELECTION WITHOUT DISCUSSION

The Government intends to evaluate proposals and award contracts without discussions with offerors. Therefore, each initial offer should contain the offeror's best terms from a cost or price and technical standpoint. However, the Government reserves the right to conduct discussions, if later determined by the Contracting Officer to be necessary.

IV. NONDOMESTIC PROPOSALS

The guidelines for proposals originating outside of the United States are the same as those for proposals originating within the United States, except that the additional conditions described in Sections 3.7 shall also apply.

V. TREATMENT OF PROPOSAL DATA

It is NASA policy to use information contained in proposals and quotations for evaluation purposes only. While this policy does not require that the proposal or quotation bear a restrictive notice, offerors or quoters should, in order to maximize protection of trade secrets or other information that is commercial or financial and confidential or privileged, place the following notice on the title page of the proposal or quotation and specify the information, subject to the notice by inserting appropriate identification, such as page numbers, in the notice. In any event, information (data) contained in proposals and quotations will be protected to the extent permitted by law, but NASA assumes no liability for use and disclosure of information not made subject to the notice.

RESTRICTION ON USE AND DISCLOSURE OF
PROPOSAL AND QUOTATION INFORMATION (DATA)

> The information (data) contained in (insert page numbers or other identification) of this proposal or quotation constitutes a trade secret and/or information that is commercial or financial and confidential or privileged. It is furnished to the Government in confidence with the understanding that it will not, without permission of the offeror, be used or disclosed for other than evaluation purposes; provided, however, that in the event a contract is awarded on the basis of this proposal or quotation, the Government shall have the right to use and disclose this information (data) to the extent provided in the contract. This restriction does not limit the Government's right to use or disclose this information (data), if obtained from another source without restriction.

VI. STATUS OF COST PROPOSALS

Submission of a Standard Form (SF) 1411 Contract Pricing Proposal Cover Sheet for the Concept Study is not required. The SF 1411 is required for all contract options after the concept study. The investigator's institution agrees that the cost proposal submitted in response to the Announcement is for proposal evaluation and selection purposes, and that, following selection and during negotiations leading to a definitive contract, the institution may be required to resubmit or execute all certifications and representations required by law and regulation.

VII. LATE PROPOSALS

The Government reserves the right to consider proposals or modifications thereof received after the date indicated for such purpose, if the selecting official deems it to offer NASA a significant technical advantage or cost reduction. (See NFS 18-15.412.)

VIII. SOURCE OF SPACE INVESTIGATIONS

Investigators are advised that candidate investigations for space missions can come from many sources. These sources include those selected through the AO, those generated by NASA in-house research and development, and those derived from contracts and other agreements between NASA and external entities.

IX. DISCLOSURE OF PROPOSALS OUTSIDE THE GOVERNMENT

NASA may find it necessary to obtain proposal evaluation assistance outside the Government. Where NASA determines it is necessary to disclose a proposal outside the Government for evaluation purposes, arrangements will be made with the evaluator for appropriate handling of the proposal information. Therefore, by submitting a proposal, the investigator and institution agree that NASA may have the proposal evaluated outside the Government. If the investigator or institution desires to preclude NASA from using an outside evaluation, the investigator or institution should so indicate on the cover. However, notice is given that if NASA is precluded from using outside evaluation, it may be unable to consider the proposal.

X. EQUAL OPPORTUNITY

For any NASA contract resulting from this solicitation, the clause at FAR 52.222-26, Equal Opportunity, shall apply.

XI. PATENT RIGHTS

A. For any NASA contract resulting from this solicitation awarded to other than a small business firm or nonprofit organization, the clause at NFS 18-52.227-70, New Technology, shall apply. Such contractors may, in advance of a contract, request waiver of rights as set forth in the provision at NFS 18-52.227-71, Requests for Waiver of Rights to Inventions.

B. For any NASA contract resulting from this solicitation awarded to a small business firm or nonprofit organization, the clause at FAR 52.227-11, Patent Rights--Retention by the Contractor (Short Form) (as modified by NFS 18-52.227-11), shall apply.

XII. RIGHTS IN DATA

Any contract resulting from this solicitation will contain the Rights in Data - General clause: FAR 52.227-14.

XIII. SMALL AND SMALL DISADVANTAGED BUSINESS SUBCONTRACTING

A. Offerors are advised that, in keeping with Congressionally mandated goals, NASA seeks to place a fair portion of its contract dollars, where feasible, with small disadvantaged business concerns, women-owned small business concerns, Historically Black Colleges and Universities, and minority educational institutions, as these entities are defined in 52.219-8 and in 52.226-2 of the FAR. For this Announcement of Opportunity, NASA has established a recommended goal of 8 percent for the participation of these entities at the prime and subcontract level. This goal is stated as a percentage of the total contract value. NASA encourages all offerors to meet or exceed this goal to the maximum extent practicable and to encourage the development of minority businesses and institutions throughout the contract period. Offerors will be evaluated on the proposed goal for participation of the entities listed above in comparison with the 8 percent goal and on the methods for achieving the proposed goal.

B. Offerors are advised that for NASA contracts resulting from this solicitation which offer subcontracting possibilities, exceed $500,000, and are with organizations other than small business concerns, the clause FAR 52.219-9 shall apply. Offerors who are selected under this AO will be required to negotiate subcontracting plans which include subcontracting goals for small, small disadvantaged, and women-owned small business concerns. Note that these specific subcontracting goals differ from the 8 percent goal described in paragraph A above, and need not be submitted with the proposal. Failure to submit and negotiate a subcontracting plan after selection shall make the offeror ineligible for award of a contract.

APPENDIX B

GUIDELINES FOR PROPOSAL PREPARATION

The following guidelines apply to the preparation of proposals in response to this Discovery and Missions of Opportunity AO. The material presented is a guide for the prospective proposer and is not intended to be all encompassing. The proposer must, however, provide information relative to those items applicable, as well as other items required by the AO. In the event of an apparent conflict between the guidelines in this Appendix and those contained within the body of the AO, those within the AO shall take precedence.

GENERAL GUIDELINES

All documents must be typewritten in English, use metric and standard astronomical units, and be clearly legible. Submission of proposal material by facsimile (fax), electronic media, videotape, or floppy disk (except as noted in Section H, below), is not acceptable. In evaluating proposals, NASA will only consider printed material in the submitted proposal. No proposal may reference a World Wide Web site for any data or material for completeness of the proposal.

The proposal must consist of only one volume, with readily identified sections corresponding to Sections D through I given below. Note the restrictions on page count for the various sections specified in the table below. If the same information is required in more than one section of the volume (e.g. instrument and spacecraft design specifications) to support the subject discussion, it may be included by reference to another section where it already exists provided such reference does not unduly impede understanding of the presented material.

In order to allow for recycling of proposals after the review process, all proposals and copies must be submitted on plain white paper only (e.g., no cardboard stock or plastic covers, no colored paper, etc.). Photographs and color figures are permitted if printed on recyclable white paper only. The original signed copy (including cover page, certifications, and non-U.S. endorsements) should be bound in a manner that makes it easy to disassemble for reproduction. Except for the original, two-sided copies are preferred. Every side upon which printing appears will be counted against the page limits.

Proposals shall contain no more than 55 pages, with exclusions to the page count noted below, including no more than five fold out pages (28 x 43 cm; i.e., 11 x 17 inches). All pages other than fold out pages shall be 8.5 x 11 inches or A4 European standard.

Single- or double-column format is acceptable. In complying with the page limit, no page should contain more than 55 lines of text and the type font should not be smaller than 12-point (i.e., less than or equal to 15 characters per inch). Figure captions should be in 12 point. Smaller font is allowed within figures and in the cost table.

The following table provides guidance on page count within the proposal:

Section	Page Limit
Cover Page and Proposal Summary	Printout of electronic submission
Table of Contents	2
Fact Sheets	2
Science Investigation description	25
Education/Public Outreach, Technology, and Small Disadvantaged Business Plans	6
Mission Implementation, Management, Schedule, Cost and Cost Estimating Methodology	20
Appendices: (No others permitted) Resumes Letter(s) of Endorsement Statement(s) of Work (SOW) for each contract Discussion on Compliance with U.S. Export Laws and Regulations NASA PI Proposing Teams Acronyms List Reference List (optional)	No page limit, but small size encouraged

The content of each proposal is described below. Note that the term "spacecraft" as used in this Appendix includes Space Shuttle carriers.

A. COVER PAGE AND PROPOSAL SUMMARY

A Cover Page and Proposal Summary must be a part of the proposal, but will not be counted against the page limit. It must be signed by the Principal Investigator and an official by title of the investigator's organization who is authorized to commit the organization. This authorizing signature now also certifies that the proposing institution has read and is in compliance with the three required certifications printed in full in Appendix F; therefore, certifications do not need to be submitted separately.

The Cover Page and Proposal Summary must be submitted electronically to the WWW site located at <http://cass.jsc.nasa.gov/panel/>. The full names of the Principal Investigator and the authorizing official, their addresses with zip code, telephone and fax numbers, and electronic mail addresses, are required on the specified form, as well as the names, institutions, and E-mail addresses of all participants, the type of investigation proposed, the total NASA OSS Cost, and a 200-word Summary. A hard copy version of this Cover must be printed in time to acquire signatures and include with the original hard copy of the proposal for delivery according to the schedule provided in Section 1.3 in this AO. Proposers are advised that they must not reformat this Cover after it is printed, as important NASA-required documentation may be lost. Proposers without access to the

Web or who experience difficulty in using this site may contact contact the Lunar and Planetary Institute by E-mail at <discpanel@lpi.jsc.nasa.gov> or by phone at (281) 486-2156 or (281) 486-2166 for assistance. Please note that submission of the electronic Cover does not satisfy the deadline for proposal submission.

It is NASA's intent to enter the Summaries of all selected investigations for its various programs into a publicly accessible database. Therefore, the Summary should not contain any proprietary or confidential information that the submitter wishes to protect from public disclosure.

B. TABLE OF CONTENTS

The proposal should contain a table of contents, which will not be counted against the page limit. This table of contents should parallel the outlines provided below in Sections D through I.

C. FACT SHEET

A Fact Sheet that provides a brief summary of the proposed investigation must be included in the proposal. The information conveyed on the Fact Sheet should include the following: science objectives (including the importance of the science to the NASA science themes), education and outreach and technology objectives, mission overview (including mission objectives and major mission characteristics), science payload, key spacecraft characteristics, anticipated launch vehicle, mission management (including teaming arrangement as known), schedule, and cost estimate. Other relevant information, including figures or drawings, may be included at the proposer's discretion. The Fact Sheet is restricted to two pages (preferably a double-sided single sheet).

D. SCIENCE INVESTIGATION

The Science Investigation section should describe the scientific objectives of the proposed investigation, including the value of the investigation to the space science themes. The primary science theme to which the investigation applies should be identified. A discussion of the scientific products and how the science products and data obtained will be used to fulfill the scientific objectives should be provided. A discussion of how the science data will be obtained, including a plan for delivery of the products, and the individuals responsible for the data delivery, should also be provided.

1. Scientific Goals and Objectives. This section should consist of a discussion of the goals and objectives of the investigation; their value to the primary and any secondary science themes; and their relationships to past, current, and future investigations and missions. It should describe the history and basis for the proposal and discuss the need for such an investigation. An overview of the mission should be provided.

The measurements to be taken in the course of the mission, the data to be returned, and the approach that will be taken in analyzing the data to achieve the scientific objectives of the investigation should be discussed. This description should identify the investigation to be performed, the quality of the data to be returned (resolution, coverage, pointing accuracy, measurement precision, etc.), and the quantity of data to be returned (bits, images, etc.). The relationship between the data products generated and the scientific objectives should be explicitly described, as should the expected results. It is assumed that the above information will constitute the Baseline Mission.

This section must also identify a minimum acceptable data and scientific return for the mission (the Performance Floor), below which the mission would not be worth pursuing. The value of the Performance should be discussed. A description of the descope options available, their phasing, and their effect on meeting the scientific objectives of the mission, as the mission is descoped from the Baseline to the Performance Floor should be discussed. Proposals should include only one Baseline mission and one Performance Floor.

2. Science Implementation.

   a. Instrumentation. This section should describe the instrumentation and the criteria used for its selection. It should identify the individual instruments and instrument systems, including their characteristics and requirements. It should indicate items that are proposed to be developed, as well as any existing instrumentation or design/flight heritage. The quality and quantity of data generated by each instrument, as they relate to the stated science investigation goals and objectives should be discussed.

      A preliminary description of each instrument design with a block diagram showing the instrument systems and their interfaces should be included, along with a presentation of the estimated performance of the instrument. These performance characteristics (which shall be considered as requirements on the flight system) should include mass, power, volume, data rate(s), pointing, and pointing accuracy, as well as resolution, precision/sensitivity and calibration requirements.

   b. Mission. The science payload observing profile should be discussed. This discussion should include all mission-relevant parameters, such as orbit and/or surface location, pointing requirements, operational time lines (including observing periods, data transmission periods and time-critical events), etc. The manner in which the stated investigation objectives and selected instruments drive the proposed mission design and operations plan should be apparent from this discussion.

c. Data Analysis and Archiving. The data reduction and analysis plan, after the data have been delivered to the ground, should be discussed, including the method and format of the data reduction, data validation, and preliminary analysis. The process by which data will be prepared for archiving should be discussed, including a list of the specific data products and the individual team members responsible for the data products. The plan must include a detailed schedule for the submission of raw and reduced data to the appropriate data archive in the proper formats, media, etc. Delivery of the data to the data archive must take place in the shortest time possible.

d. Science Team. This section must identify each necessary individual of the investigation science team and their roles and responsibilities. The capabilities and experience of all members of the proposed science team must be described. Resumes or curriculum vitae of team members should be included as attachments to the proposal (see Section G, below). The role of each Co-Investigator must be explicitly defined and justified, and the funding source (NASA or contributed) for the PI and each Co-Investigator noted. A letter of endorsement is required from each Co-Investigator's institution if the Co-Investigator's services are contributed (see Section I.2).

E. EDUCATION/ PUBLIC OUTREACH, NEW TECHNOLOGY, AND SMALL DISADVANTAGED BUSINESS PLAN

The education, outreach, technology, and small disadvantaged business plan should provide a summary of the benefits offered by the mission beyond the scientific benefits brought by obtaining and analyzing the desired scientific data.

1. Educational Program Activities. This section should discuss the degree to which this investigation will generate educational opportunities and contribute to the Nation's educational initiatives. The breadth of involvement of the educational program, including educators, researchers, amateur organizations, and the public at large should be discussed, as should educational activities to be implemented. A management plan, workforce staffing plan, and coordination/collaboration with educational institutions should be described, along with a discussion of how the mission team will implement and evaluate the educational program. A budget targeted to educational activities, including any potential leveraging of other resources, a brief budget explanation, and a timeline for the execution of the education program, should be provided. E/PO workforce staffing and budget information must be provided per the E/PO workforce and budget templates given in Appendix C of this AO. Letters of support/commitment from partners/subcontractors and resumes from key E/PO personnel should be included as appendices to the proposal. See Appendix C for additional information about the E/PO effort.

2. Public Awareness. This section should describe the degree to which the scientific investigation and discoveries will be communicated to the public. The public awareness plan should address how the progress of and results from the mission will be disseminated to the public; the management and interaction of the various team members; a budget and schedule of the public awareness activities with mission progression; and an evaluation plan.

3. Small Disadvantaged Business. A summary plan is required specifying the proposed investigation's commitment to meet the SDB participation goal of 8% as described in Section XIII of Appendix A of the AO.

4. New Technology. This section should discuss how new technology relates to the proposed investigation, including: (1) insertion of new technology into the project, (2) transfer of new technology from the project to other projects or programs, and (3) commercialization of new technology. The functions that the new technology performs and how it will be demonstrated for the investigation should be described. Also to be discussed is the development of partnerships among space, non-space firms, educational, other nonprofit organizations, and government entities to facilitate technology development, transfer, and commercialization along with how the mission team will implement the transfer and/or commercialization.

F. MISSION IMPLEMENTATION

This section should provide a description of the mission, including mission design, instrument accommodation, spacecraft, launch vehicle required, ground systems, communications approach, and mission operations plan. Specific information should be included that describes the unique requirements placed on these mission elements by the science investigation. If the Space Shuttle is proposed as the launch vehicle, the proposal must state whether the investigation is considered a primary or a secondary payload, specify the target flight assignment, and provide justification for Shuttle use as required by Public Law 101-6111 (see the *Discovery Space Shuttle Launch Opportunities* document in the Discovery Program Library/Appendix E).

As part of this section, describe the development approach that will assure mission success. Include the following items to the degree they are known:

- Heritage and maturity of mission elements (spacecraft, ground systems, and mission design, etc.);
- Approach to the use or nonuse of redundancy and other reliability measures;
- Requirements for burn-in of parts and total operating time required without failure prior to flight;
- Assembly, integration and test flows and integration and test approach;
- Environmental test philosophy (test flow and sequence, test margins and test durations)

- Product assurance activities;
- Systems engineering and trade studies;
- Potential risks to the proposed investigation and plans for mitigating those risks; and
- Technology development plans and back-up plans if technologies do not meet development needs (new technology may be penalized for risk if adequate back-up plans are not described to ensure success of the investigation).

It is recognized that teaming arrangements to implement the investigation may not be complete at the time of the proposal. Proposers will not be penalized for this if it is demonstrated that there are candidate implementation approaches for the spacecraft, launch vehicle, communications, and ground systems that will allow the successful implementation of the investigation within the proposed cost and schedule.

In addition to the information above, the specific data identified below should be provided (in tables) as known and as applicable to the mission configuration proposed.

1. General information.
   Launch date (including launch date flexibility), mission duration, orbit type (Earth orbit, heliocentric, etc.), orbit parameters (semimajor axis, eccentricity, inclination, node time of day, argument of perigee, altitude).

2. Downlink Information.
   Data rate and volume (kbps, Mbytes/day,), bit error rate, onboard storage (Mbytes), power available for communications (watts), number of data dumps per day, spacecraft data destination (*e.g.*, mission operations center), science data destination (*e.g.*, science operations center), and maximum time lag between data dump and data arrival at destination if relevant to science needs.

3. Uplink Information.
   Number of uplinks per day, number of Bytes per uplink, bit error rate, and approach and schedule for obtaining license(s) for use of proposed frequency bands.

4. Resources and Margins.
   For satellite (instrument package and spacecraft), provide estimates for mass, power, and reserves at the subsystem level (including propellant), and margins at the system level. For instrument package requirements on the spacecraft, provide pointing, stability, attitude, and maneuvering requirements necessary for science operations (include design margins, when known).

Definitions:

Contingency (or *reserve*), when added to a resource, results in the maximum expected value for that resource. Percent contingency is the value of the contingency divided by the value of the resource less the contingency.
Margin is the difference between the maximum possible value of a resource (the physical limit or the agreed-to limit) and the maximum expected value for a resource. Percent margin for a resource is the available margin divided by its maximum expected value.
Example: A payload in the design phase has an estimated mass of 115 kg including a mass reserve of 15 kg. There is no other payload on the ELV and the ELV provider plans to allot the full capability of the vehicle, if needed. The ELV capability is 200 kg. The mass reserve is 15/100 = 15%, and the mass margin is 85 kg or 85/115 = 74%. Example: The end-of-mission life capability of a spacecraft power system is 200 Watts. The proposed instrument is expected to use 40 Watts, and a 25% contingency is planned. 75 Watts is allotted by the satellite provider. The reserve is 10 Watts while the margin is 25 watts, or 25/50 = 50%.

5. Attitude and Control Requirements
   - Control method (3-axis, spinner, gravity gradient, *etc*.)
   - Control reference (solar, inertial, Earth-nadir, Earth-limb, *etc*.)
   - Attitude control requirements for bias, drift, stability or jitter, and rate for scanning (each axis)
   - Spacecraft attitude knowledge requirements at the instrument interface for bias, drift, jitter, and rate for scanning (each axis)
   - Agility (maneuvers, scanning, *etc*.)
   - Deployments (solar panel, antennas, *etc*.)
   - Articulation (1- or 2 -axis solar arrays, antennas, gimbals, *etc*.)
   - On-orbit calibration (alignment, line-of-sight, thermal deformation)
   - Attitude knowledge processing (*e.g.* real-time versus postprocessing, spaceborne versus ground)

6. Instrument Characteristics
   - Bias, drift, and noise of instrument data used in pointing control and knowledge determination.
   - Character of significant instrument-generated jitter and momentum.

7. Spacecraft Characteristics
   - Number, type and redundancy of the attitude and control system sensors and actuators.
   - A block diagram of the spacecraft system components.

For Missions of Opportunity, provide the information above that is related to the proposed investigation's requirements on and interfaces with the sponsor's instrument/spacecraft.

G. MANAGEMENT AND SCHEDULE

This section should summarize the investigator's proposed management approach. The management organization (including an organization chart) and decision-making process should be described, and the teaming arrangement (as known) should be discussed. The responsibilities of team members, including contributors, and institutional commitments should be discussed. Unique capabilities that each team member organization brings to the team, as well as previous experience with similar systems and equipment, should be addressed. The specific roles and responsibilities of the Principal Investigator and Project Manager must be described, but key project personnel (e.g., the Project Manager) need not be identified by name at this time. Risk management and risk mitigation plans must be described. This discussion should include the top 3-5 risks, descoping strategies, if relevant, and management strategies for control, allocation and release of technical, cost and schedule reserves and margins. When contracts are required, the acquisition strategy including the incentive strategy should be described.

A project schedule to meet the proposed launch date and covering all phases of the investigation should be provided. The schedule should include, as a minimum, proposed major project review dates; instrument development; spacecraft development; instrument-to-spacecraft integration and test; launch vehicle integration; and mission operations and data analysis. Schedule reserve should be clearly identified.

Mission of Opportunity proposals should specifically address how the investigation team will interrelate with the sponsoring organization, organizationally and managerially. Mission of Opportunity proposals should also address:

The status of the commitment from the spacecraft builder/owner or sponsoring organization to fly the proposed instrument or conduct the proposed investigation.

Describe if and how the proposed investigation relates to the spacecraft sponsor's overall mission objectives.

Describe the investigation development plan and how it fits in the development plan for the sponsor's mission.

Describe how the operations plan for the proposed investigation fits within the mission of the sponsoring organization.

H. COST AND COST ESTIMATING METHODOLOGY

This section shall include an estimated cost of the investigation that encompasses all proposed activities, including all applicable mission phases, launch services, development of the ground data system, fee, and contributions. These costs shall be consistent with the program requirements described in Section 3, 4, and 5 of the AO. The amount required in each fiscal year should be identified by providing the data in Tables B1 and B3 for Discovery missions and Tables B2 and B3 for Missions of Opportunity. The top portion of Table B1 requests cost data relative to the NASA OSS Cost while the lower portion requests cost data relative to contributions. Table B2 requests NASA OSS cost data for Missions of Opportunity. Table B3 summarizes the NASA OSS Cost by Phase. The completed tables will not be counted against the page limit. Table B4 gives the NASA inflation index to be used to calculate real year dollars. Note that if the Shuttle is proposed as the launch vehicle, a Shuttle transportation cost which is based upon payload weight/volume must be obtained from the Shuttle Office at NASA Headquarters and included in launch services costs (see *Discovery Shuttle Shuttle Launch Opportunities* document in the Discovery Program Library) . This cost will be used for evaluation cost comparison purposes only.

Proposers are also requested to submit the data in Table B1 or B2, as appropriate, and Table B3, on a floppy disk with their original, signed proposal. The disk may be either IBM-compatible or Macintosh-compatible and the cost data, including the headings for the rows and columns, should be in tab-delimited text files. The disk should be labeled with the title of the proposal and the PI's name.

The methodology used to estimate the cost, for example, specific cost model, past performance, cost estimating relationships from analogous missions, should be discussed. Budget reserve strategy, including budget reserve levels as a function of mission phase, should be discussed. Please provide assumptions used in developing cost estimates to help facilitate reviewer understanding of proposed cost estimates.

I. APPENDICES

The following additional information is <u>required</u> to be supplied with the proposal as Appendices and, as such, will not be counted within the specified page limit. <u>NO OTHER APPENDICES ARE PERMITTED.</u>

1. <u>Statement of Work (SOW) and Funding Information.</u> For investigations managed from non-Government institutions, provide a SOW. For investigations managed from Government institutions, provide a SOW as if the institution were non-Government. This SOW must include the requirement for a concept study report that is described in the Guidelines for Concept Study Report document available through the Discovery Program Library. The SOW must include general tasks statements for Phases B/C/D and for Phase E for Discovery Mission investigations and Missions of Opportunity investigations. All SOW's should include the following as a minimum: Scope of Work, Deliverables

(including science data), and Government Responsibilities (as applicable). SOW's need not be more than a few pages in length. If more than one contractual arrangement between NASA and the proposing team is required, funding information must be provided which identifies how funds are to be allocated among the organizations.

2. Letters of Endorsement. Letters of endorsement must be provided from all organizations offering critical goods and /or services (including Co-Investigator services) on a no-exchange-of-funds basis, non-U.S. organizations providing hardware or software to the investigation, the Launch Service provider if the launch service is not provided through a NASA contract, and the major participants in the proposal. Letters of endorsement must provide evidence that the institution and/or government officials are aware and supportive of the proposed investigation and will pursue funding for the investigation if selected by NASA. They must be signed by institutional and/or Government officials authorized to commit their organizations to participation in the proposed investigation.

3. Resumes. Provide resumes or curriculum vitae for all science team members identified in the science section and for all named key project personnel. Each resume should contain the information in the order given as follows:
   a) the name and organization of the individual,
   b) a one sentence description of the individual's job or role on the project,
   c) the resume or vitae clearly showing experience related to the job the individual will perform on the proposed investigation,
   d) the commitment signature of the individual and the date,
   e) if any portion of the commitment is a contribution (not reimbursed by the project), the amount (%) of the contribution and the signature of an authorizing official of the individual's organization.

   The complete resume form should be no longer than two pages in length for each participant.

4. Discussion on Compliance with U.S. Export Laws and Regulations. Investigations that include international participation, either through involvement of non-U.S. nationals and/or involvement of non-U.S. entities must include a section discussing compliance with U.S. export laws and regulations; e.g., 22 CFR 120-130, *et seq*. and 15 CFR 730-774, *et seq*., as applicable to the scenario surrounding the particular international participation. The discussion must describe in detail the proposed international participation and is to include, but not be limited to, whether or not the international participation may require the proposer to obtain the prior approval of the Department of State or the Department of Commerce via a technical assistance agreement or an export license, or whether a license exemption/exception may apply. If prior approvals via licenses are necessary, discuss whether the license has been applied for or if not, the projected timing of the application and any implications for the schedule. Information regarding U.S. export regulations is available through Internet URLs http://www.pmdtc.org and http://www.bxa.doc.gov. Proposers are advised that under

U.S. law and regulation, spacecraft and their specifically designed, modified or configured systems, components, parts, etc., such as the instrumentation being sought under this AO, are generally considered "Defense Articles" on the United States Munitions List and subject to the provisions of the International Traffic in Arms Regulations, 22 CFR 120-130, *et seq*.

5. NASA Principal Investigator Proposing Teams. Proposals submitted by NASA employees as Principal Investigators should contain the following information concerning the process by which non-Government participants were included in the proposal. The proposal should (i) indicate that the supplies or services of the proposed non-Government participant(s) are available under an existing NASA contract; (ii) make it clear that the capabilities, products, or services of these participant(s) are sufficiently unique to justify a sole source acquisition; or (iii) describe the open process that was used for selecting proposed team members. While a formal solicitation is not required, the process cited in (iii) above should include at least the following competitive aspects: notice of the opportunity to participate to potential sources; submissions from and/or discussions with potential sources; and objective criteria for selecting team members among interested sources. The proposal should address how the selection of the proposed team members followed the objective criteria and is reasonable from both a technical and cost standpoint. The proposal should also include a representation that the Principal Investigator has examined his/her financial interests in or concerning the proposed team members and has determined that no personal conflict of interest exists. The proposal must provide a certification by a NASA official superior to the Principal Investigator verifying the process for selecting contractors as proposed team members, including the absence of conflicts of interest.

6. Acronyms List.

The following information may be provided.

References List. Proposals may provide, as an appendix, a list of reference documents and materials used in the proposal. The documents and materials themselves cannot be submitted, except as a part of the proposal and included within the prescribed page count.

TABLE B1
TOTAL MISSION COST FUNDING PROFILE TEMPLATE
FOR DISCOVERY MISSIONS
(FY costs* in Real Year Dollars, Totals in Real Year and FY2001 Dollars)

Cost Element**	FY1	FY2	FY3	FY4	FY5	...	FYn	Total (Real Yr.)	Total (FY 2001)
NASA OSS Cost:									
Proj Mgt/Sys Engineering									
Instrument A									
Instrument B									
Spacecraft -S/C Bus -S/C Int, Assy, & test -Launch C/O & Orb Ops									
MO&DA***									
DSN									
Ground Data System Dev									
Launch services									
Reserves									
Other (specify)									
Total NASA OSS Cost	$	$	$	$	$	$	$	$	$
Contributions:									
Proj Mgt/Sys Eng									
Instrument A									
Instrument B									
Spacecraft									
MO&DA									
DSN									
Ground Data System Dev									
Launch services									
Reserves									
Other									
Total Contributions	$	$	$	$	$	$	$	$	$
								Total Mission Cost	$

* Costs should include all costs including any fees
** Refer to Discovery Program Library for Definition of Cost Elements
*** Mission Operations and Data Analysis

TABLE B2
NASA OSS COST FUNDING PROFILE TEMPLATE
FOR MISSIONS OF OPPORTUNITY
(FY costs* in Real Year Dollars, Totals in Real Year and FY2001 Dollars)

Cost Elements**	FY1	FY2	FY3	FY4	FY5	...	FYn	Total (Real Yr.)	Total (FY 2001)
Proj Mgt/Sys Eng									
Instrument A									
Instrument B									
Ground Data System Dev									
MO&DA***									
DSN									
Reserves									
Other (specify)									
NASA OSS Cost	$	$	$	$	$	$	$	$	$

* Costs should include all costs including any fee
** Refer to Discovery Program Library for Definition of Cost Elements
*** Mission Operations and Data Analysis

TABLE B3
MISSION PHASE SUMMARY OF NASA OSS COST
(FY costs in Real Year Dollars, Phase Totals in Real Year and FY2001 dollars)

Mission Phase	FY1	FY2	FY3	FY4	FY5	...	FYn	Total (RY$)	Total (FY01$)
Phase A/B									
Phase C/D									
Phase E									
Launch Vehicle									
FY Totals	$	$	$	$	$	$	$	$	$

TABLE B4

NASA NEW START INFLATION INDEX

Fiscal Year	2001	2002	2003	2004	2005	2006	2007	2008
Inflation Rate	0.0%	3.8%	3.9%	3.9%	3.9%	3.9%	3.9%	3.9%
Cumulative Inflation Index	1.0	1.038	1.081	1.123	1.166	1.212	1.259	1.308

Use an inflation rate of 3.9% for years beyond 2008.

APPENDIX C

EDUCATION/PUBLIC OUTREACH EVALUATION CRITERIA AND PROPOSAL PREPARATION ASSISTANCE

I. EXPLANATORY GUIDE TO THE NASA OFICE OF SPACE SCIENCE EDUCATION & PUBLIC OUTREACH EVALUATION CRITERIA

The NASA Office of Space Science (OSS) has recognized a strategic need to take greater advantage of the space science community's inspirational assets to have a powerful, positive impact on K-14 science education and public outreach (E/PO). The OSS E/PO Strategy and E/PO Implementation Plan (see below for web link) both call for E/PO to become an integral part of the space science community's professional activities. They also call for the policies, funding, and infrastructure necessary to facilitate opportunities for the space science community to become more deliberately and effectively engaged in E/PO.

OSS has also developed a set of Evaluation Criteria for the E/PO segments of R&D proposals to guide investigators in aligning their proposed efforts with the goals and objectives of the OSS E/PO strategy and implementation plans. These criteria also serve as the basis for judging the quality of these E/PO segments. It is vital that everyone concerned (i.e., proposers, E/PO partners and facilitators, reviewers) has a common understanding of what these criteria mean in practice. The Explanatory Guide to the OSS E/PO Evaluation Criteria is intended to support the development of such a common understanding.

The Guide begins with answers to questions frequently asked (FAQ) by members of the space science community who are preparing an E/PO segment to an OSS proposal. The FAQs offer information in support of proposal preparation and understanding the intention of the Evaluation Criteria. The Guide then provides a brief elaboration of each of the OSS E/PO Evaluation Criteria. These descriptions include references to pertinent information in the FAQ, and they also include "Indicators" that may be used by both proposers and reviewers to assess how well an E/PO proposal segment is meeting the Evaluation Criteria.

The information contained in this document is intended to give a flavor of what exemplary E/PO can be rather than a prescription for what to do. It is based on experience to date and thus the contents of the Guide will evolve time with regular updates. For the latest version, please link through Education and Public Outreach at the NASA OSS Web site http://spacescience.nasa.gov.

II. EDUCATION AND PUBLIC OUTREACH EVALUATION CRITERIA

There are seven evaluation criteria against which proposed OSS E/PO activities are evaluated -- four general criteria and three specific criteria. The general criteria are applicable to the evaluation of all proposals and they reflect requirements necessary for further consideration of the proposal.

General Criteria

1. The quality, scope, and realism of the proposed E/PO program including the adequacy, appropriateness, and realism of the proposed budget;
2. The capability and commitment of the proposer and the proposer's team, and the direct involvement of one or more science team members in overseeing and carrying out the proposed E/PO program;
3. The establishment or continuation of effective partnerships with institutions and/or personnel in the fields of educational and/or public outreach as the basis for and an integral element of the proposed E/PO program; and
4. The appropriateness (NRAs) or adequacy (AOs) of plans for evaluating the effectiveness and impact of the proposed education/outreach activity.

To ensure that the goals and objectives of the OSS E/PO strategy are realized in practice, proposals will also be evaluated using one or more of the specific criteria listed below. E/PO programs associated with AOs have a much larger scope and thus should address several, if not all, of the specific review criteria listed below.

Specific Criteria

5. For proposals dealing directly with or strongly affecting the formal education system (e.g., through teacher workshops or student programs carried out at informal education institutions such as science museums and planetariums), the degree to which the proposed E/PO effort is aligned with and linked to nationally recognized and endorsed education reform efforts and/or reform efforts at the state or local levels;
6. The degree to which the proposed E/PO effort contributes to the training, involvement, and broad understanding of underserved and/or underutilized groups in science and technology;
7. The potential for the proposed E/PO activity to expand its scope by having an impact beyond the direct beneficiaries, reaching relatively large audiences, being suitable for replication or broad dissemination, or drawing on resources beyond those directly requested in the proposal.

III. TWO IMPORTANT EXAMPLE FAQs FROM THE E/PO EXPLANATORY GUIDE

Can OSS E/PO funds be used to support efforts directed towards higher education?

In general, no. OSS E/PO funds are intended to support K-12 education and public outreach rather than higher education. However, there are important exceptions such as undergraduate programs to enhance the science literacy of non-scientists and future K-12 teachers, and to increase the participation of minorities and other underutilized groups (e.g., women) in science and engineering.

Can OSS E/PO funding be used for Public Affairs or Public Relations?

In general, no. Public Affairs or Public Relations (PR) products and activities are important to public awareness, but they are not appropriate for funding by the OSS E/PO initiative. PR products may include press conferences, press releases, video clips, mission-related brochures, posters, lithographs, and toys. Some of these products can be tailored or modified for E/PO uses. For example, a poster or toy could be packaged with an educational guide or insert that takes advantage of the interest and learning opportunity stimulated by the poster image or the playful appeal of the toy. A video clip and text from a press release might be adapted for use in a teacher guide or workshop. Such tailoring or development of educational products to accompany PR products is potentially fundable with OSS E/PO funds, but it should not dominate an E/PO proposal. In particular, OSS resources for E/PO should not be used for "give-away" souvenirs like coffee mugs, lapel pins, patches, T-shirts, mouse pads, and other items of limited educational value.

IV. ASSISTANCE WITH THE DEVELOPMENT OF AN E/PO PROGRAM

NASA OSS has established a nation-wide infrastructure of space science education/public outreach groups whose purpose is to directly aid space science investigators in identifying and developing high quality E/PO opportunities. This infrastructure provides the coordination, background, and linkages for fostering partnerships between the space science and E/PO communities, and the services needed to establish and maintain a vital national, coordinated, long-term OSS E/PO program. Of particular interest are two elements of this system :

a.) Four OSS science theme-oriented E/PO "Forums" have been established to help orchestrate and organize in a comprehensive way the education/outreach aspects of OSS space science missions and research programs, and provide both the space science and education communities with ready access to relevant E/PO programs and products; and
b) Five regional E/PO "Broker/Facilitators" to search out and establish high leverage opportunities, arrange alliances between educators and OSS-supported scientists, and help scientists turn results from space science missions and programs into educationally-appropriate activities suitable for regional and/or national dissemination.

Proposers are strongly encouraged to make use of these groups to help identify suitable E/PO opportunities and arrange appropriate alliances. Proposers should be careful to note that these Forums and Broker/Facilitators have been established to provide help, but the responsibility for actually developing the E/PO program and writing the proposal is that of the proposer. Points of contact and addresses for all of these E/PO Forums and Broker/Facilitators may be found at the URL http://spacescience.nasa.gov/education/edprog.htm

V. ADDITIONAL INFORMATION

General questions about the OSS E/PO program may be directed to:
Dr. J. David Bohlin
Code SR
Office of Space Science
NASA Headquarters
Washington, DC 20546
E-mail: david.bohlin@hq.nasa.gov
Telephone: 202/358-0880

V. TEMPLATES FOR E/PO COST AND WORKFORCE

E/PO Template #1
E/PO Program Budget
(FY00$K)

	FY1	FY2	FY3	FYn	TOTAL
Personnel					
Consultants					
Stipends					
Equipment					
Travel					
Supplies					
Subcontract #1					
Subcontract #2					
Subcontract #n					
Misc					
Indirect					
TOTAL					

E/PO Template #2
Subcontract Budgets
(FY00 $K)

	Subcontract #1	Subcontract #2	Subcontract #n
Personnel			
Consultants			
Stipends			
Equipment			
Travel			
Supplies			
Other			
TOTAL			

E/PO Template #3

Key Personnel

(Percent Time Committed/Direct Costs, Including Benefits, in FY00 $K)

	FY1	FY2	FY3	FYn	Total
Institution 1					
PI (% time)					
PI (direct cost)					
E/PO lead (% time)					
E/PO (direct cost)					
Institution 2					
PI (% time)					
PI (direct cost)					
E/PO lead (% time)					
E/PO (direct cost)					
Institution n					
PI (% time)					
PI (direct cost)					
E/PO lead (% time)					
E/PO (direct cost)					

APPENDIX D

REGULATIONS GOVERNING PROCUREMENT OF FOREIGN GOODS OR SERVICES

The following Federal Acquisition Regulation (FAR) clauses cover the purchase of foreign goods and services and may be included in contracts resulting from this Announcement of Opportunity:

52.225-3 Buy American Act -- Supplies (January 1994)

52.225-7 Balance of Payments Program (April 1984)

52.225-9 Buy American Act -- Trade Agreements -- Balance of Payments Program (January 1996)

52.225-10 Duty-Free Entry (April 1984)

52.225-11 Restrictions on Certain Foreign Purchases (May 1998)

52.225-18 European Union Sanction for End Products (January 1996)

52.225-19 European Union Sanction for Services (January 1996)

52.225-21 Buy American Act -- North American Free Trade Agreement Implementation Act -- Balance of Payments Program (January 1997)

The proposer is directed to the Federal Acquisition Regulations and the NASA FAR Supplements for further information on these regulations. Access information for these documents is given in the Discovery Program Library (see Appendix E).

APPENDIX E

CONTENTS OF THE DISCOVERY PROGRAM LIBRARY

The Discovery Program Library includes documents available electronically via the Internet, as well as paper copy. Proposers are requested to access the document electronically where possible. Only limited paper copies of some documents are available, therefore, requests for copies must be approved by NASA Headquarters. Please note that not all documents are available via the Discovery Program Library, but access information is provided.

It is incumbent upon the proposer to ensure that the documents used in proposal preparation are of the date and revision listed in the Announcement of Opportunity or this Appendix.

The Discovery Program Library is accessible on the World Wide Web at the URL address:

http://discovery.larc.nasa.gov/discovery/dpl.html

Requests for paper copies must be submitted in writing to:

Dr. Jay Bergstralh
Research Program Management Division
Office of Space Science
Code SR
Ref. Discovery 00
National Aeronautics and Space
Administration
Washington, DC 20546-0001
Fax Number: (202) 358-3097
E-mail: jay.bergstralh@hq.nasa.gov
Phone: (202) 358-0313

Office of Space Science Strategies and Policies

The Space Science Enterprise Strategic Plan: Origins, Evolution, and Destiny of the Cosmos and Life **(**November 1997)

This document is a concise statement of the goals and outlook of NASA's Space Science Enterprise. It is a compilation of the major ideas described in more detail in the context of the overall NASA Strategic Plan.

Partners in Education: A Strategy for Integrating Education and Public Outreach into NASA's Space Science Programs (March 1995)

This document describes the overall strategy for integrating education and public outreach into NASA's space science programs.

Implementing the Office of Space Science (OSS) Education/Public Outreach Strategy (October 1996)

This document describes OSS's overall approach to implementing its Education/Public Outreach strategy.

Explanatory Guide to the NASA Office of Space Science Education and Public Outreach Evaluation Criteria (April 1999)

Answers to frequently asked questions, elaboration of each of the OSS E/PO criteria. Document is intended to give a flavor of what exemplary E/PO can be.

The Space Science Enterprise Integrated Technology Strategy (October 1998)

Describes efforts to manage technology infusion into future OSS missions and to promote technology transfer to the private sector.

Space Science Roadmaps

The science themes of the NASA Office of Space Science, through the Space Science Advisory Committee and its subcommittees, have developed Roadmaps. These planning documents prioritize the space science goals for NASA for the years 2000-2020. The following Roadmaps apply to the Discovery Program:

Mission to the Solar System: Exploration and Discovery, A Mission and Technology Roadmap, 2000-2025 (September 1996)

Search for Origins Roadmap (April 1997)

A paper copy may be obtained by sending an E-mail with name and address to <hthronson@hq.nasa.gov>.

Space Science Supporting Documents

HST and Beyond. Exploration and Search for Origins: A Vision for Ultraviolet - Optical - Infrared Space Astronomy (May 1996)

Report of the HST and Beyond Committee.

Exploration of Neighboring Planetary Systems (ExNPS) Study (August 1996)

Jet Propulsion Laboratory report. Mission and technology road map and presentation to the Townes Blue Ribbon Panel.

SSES: Solar System Exploration 1995-2000 (September 1994).

NRC Committee on Planetary and Lunar Exploration: An Integrated Strategy for the Planetary Sciences: 1995-2010 (May 15, 1996)

Discovery Guidelines and Requirements Documents

NASA's Mission Operations and Communications Services.

Describes the functions and costs of Ground Data Systems and Mission Operations and Data Analysis available via NASA.

Discovery Launch Services Information Summary

Provides information on capabilities and costs of launch services that are available to launch Discovery spacecraft selected pursuit to this AO.

Discovery Space Shuttle Launch Opportunities

Provides information on capabilities and costs of launch services that are available to Discovery spacecraft that utilize this option of this AO.

Navigation and Ancillary Information Facility Services for Discovery Missions

Provides information relative to the NASA Ancillary Information Facility and the SPICE capability for mission design, mission planning, observation planning, and interpretation of scientific observations.

Guidelines for Concept Study Report Preparation

Provides proposers who are selected via the AO guidelines for preparations of the Concept Study Report.

Concept Study Evaluation Criteria

Defines the criteria and weighting by which the Concept Study Report will be evaluated.

Cost Element Definitions

Provides definitions for all major cost elements for proposals and concept study reports.

General Guideline and Requirements Documents

Example of International Agreement

Example of an Agency to Agency agreement for International cooperation.

Example Mission Definition and Requirements Agreement

Example of such an agreement.

NPG 7120.5A--NASA Program and Project Management Processes and Requirements (April 1998)

This document provides a reference for typical activities, milestones, and products in the development and execution of NASA missions.

ISO 9000 Series

The following ISO 9000 quality documents describe current national and NASA standards of quality processes and procedures. American National Standard, "Quality Systems - Model for Quality Assurance in Design, Development, Production, Installation, and Servicing," ANSI/ASQC Q9001-1994.

"Quality Management and Quality System Elements - Guidelines," ANSI/ASQC Q9004-1-1994.

"Quality Management and Quality Assurance Standards - Guidelines for Selection and Use," ANSI/ASQC Q9000-1-1994

"ISO 9000 and NASA," Office of Safety and Mission Assurance (Code Q) presentation, April 24, 1995.

Note: The first three ISO 9000-related documents are copyrighted and cannot be reproduced without appropriate compensation. For copies contact:

American Society for Quality Control (ASQC)
P.O. Box 3066
Milwaukee, WI 53201-3066
(800) 248-1946

Planetary Data System Data Preparation Workbook (February 1995*).*

This document describes the basic formats and requirements used for the archiving of planetary data products by the Planetary Data System (PDS).

Planetary Protection Requirements.

Includes information on Planetary Protection Requirements for NASA spacecraft missions.

NASA Technology Transfer Resources.

The NASA Commercial Technology Network (CTN) serves as an integrated information resource for NASA technology transfer and commercialization.

Discovery Program Background

Discovery Management Workshop Reports.

Includes "*Final Report of the Discovery Management Workshop"* and *Recommendations for Discovery Policy and Implementation Guidelines,* two documents generated by the April 1993 Discovery Management Workshop which was convened to address issues in the management of individual Discovery missions and of the Discovery Program as a whole.

Discovery Program Lessons-Learned Workshop.

This report provides a summary of the lessons learned from the first Discovery AO as a result of the Discovery Program Lessons-Learned Workshop.

Minutes of the Third Workshop on Discovery Missions Program: Lessons Learned

(URL: http://discovery.larc.nasa.gov/discovery/announcements.html)

Directives and Procurement-related Information

Electronic versions only are available for the following:

NASA Online Directives Information System (NODIS) II.

The NODIS II Directives Library provides online access to the NASA Policy Directives (NPD's - formerly NMI's), NASA Procedures and Guidelines (NPG's - formerly NHB's) and NASA's Policy Charters (NPC's).

Federal Acquisition Regulations (FAR) General Services Administration

(URL: http://www.arnet.gov/far/)

NASA FAR Supplement Regulations

(URL: http://www.hq.nasa.gov/office/procurement/regs/nfstoc.htm)

NASA Financial Management Manual

(URL: http://www.hq.nasa.gov/fmm/

NPG 5800.1D -- Grant and Cooperative Agreement Handbook (July 1996)
(URL: http://nais.msfc.nasa.gov/msfc/grcover.htm)

Environmental Quality Regulations
(URL: http:// www.access.gpo.gov/nara/cfr/index.html)

APPENDIX F

Included for reference only. Submission of the signed printout of web page as directed for the Cover Page/Proposal Summary certifies compliance with these certifications.

Certification of Compliance with the NASA Regulations Pursuant to Nondiscrimination in Federally Assisted Programs

The *(Institution, corporation, firm, or other organization on whose behalf this assurance is signed, hereinafter called "Applicant ")* hereby agrees that it will comply with Title VI of the Civil Rights Act of 1964 (P.L. 88-352), Title IX of the Education Amendments of 1962 (20 U.S.C. 1680 et seq.), Section 504 of the Rehabilitation Act of 1973, as amended (29 U.S.C. 794), and the Age Discrimination Act of 1975 (42 U.S.C. 16101 et seq.), and all requirements imposed by or pursuant to the Regulation of the National Aeronautics and Space Administration (14 CFR Part 1250) (hereinafter called "NASA") issued pursuant to these laws, to the end that in accordance with these laws and regulations, no person in the United States shall, on the basis of race, color, national origin, sex, handicapped condition, or age be excluded from participation in, be denied the benefits of, or be otherwise subjected to discrimination under any program or activity for which the Applicant receives federal financial assistance from NASA; and hereby give assurance that it will immediately take any measure necessary to effectuate this agreement.

If any real property or structure thereon is provided or improved with the aid of federal financial assistance extended to the Applicant by NASA, this assurance shall obligate the Applicant, or in the case of any transfer of such property, any transferee, for the period during which the real property or structure is used for a purpose for which the federal financial assistance is extended or for another purpose involving the provision of similar services or benefits. If any personal property is so provided, this assurance shall obligate the Applicant for the period during which the federal financial assistance is extended to it by NASA.

This assurance is given in consideration of and for the purpose of obtaining any and all federal grants, loans, contracts, property, discounts, or other federal financial assistance extended after the date hereof to the Applicant by NASA, including installment payments after such date on account of applications for federal financial assistance which were approved before such date. The Applicant recognized and agrees that such federal financial assistance will be extended in reliance on the representations and agreements made in this assurance, and that the United States shall have the right to seek judicial enforcement of this assurance. This assurance is binding on the Applicant, its successors, transferees, and assignees, and the person or persons whose signatures appear below are authorized to sign on behalf of the Applicant.

Certification Regarding Debarment, Suspension, and Other Responsibility Matters
Primary Covered Transactions

This certification is required by the regulations implementing Executive Order 12549, Debarment and Suspension, 14 CFR Part 1265.

A. The applicant certifies that it and its principals:

(a) Are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from covered transactions by any Federal department or agency;

(b) Have not within a three-year period preceding this application been convicted or had a civil judgment rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, State, or Local) transaction or contract under a public transaction; violation of Federal or State antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, or receiving stolen property;

(c) Are not presently indicted for or otherwise criminally or civilly charged by a government entity (Federal, State, or Local) with commission of any of the offenses enumerated in paragraph A.(b) of this certification;

(d) Have not within a three-year period preceding this application/proposal had one or more public transactions (Federal, State, or Local) terminated for cause or default; and

B. Where the applicant is unable to certify to any of the statements in this certification, he or she shall attach an explanation to this application.

C. Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion -- Lowered Tier Covered Transactions (Subgrants or Subcontracts)

(a) The prospective lower tier participant certifies, by submission of this proposal, that neither it nor its principles is presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participation in this transaction by any federal department of agency.

(b) Where the prospective lower tier participant is unable to certify to any of the statements in this certification, such prospective participant shall attach an explanation to this proposal.

Certification Regarding Lobbying

As required by S 1352 Title 31 of the U.S. Code for persons entering into a grant or cooperative agreement over $100,000, the applicant certifies that:

(a) No Federal appropriated funds have been paid or will be paid by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, in connection with making of any Federal grant, the entering into of any cooperative, and the extension, continuation, renewal, amendment, or modification of any Federal grant or cooperative agreement;

(b) If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting an officer or employee of any agency, Member of Congress, or an employee of a Member of Congress in connection with this Federal grant or cooperative agreement, the undersigned shall complete Standard Form -- LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions.

(c) The undersigned shall require that the language of this certification be included in the award documents for all subawards at all tiers (including subgrants, contracts under grants and cooperative agreements, and subcontracts), and that all subrecipients shall certify and disclose accordingly.

This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by S1352, title 31, U.S. Code. Any person who fails to file the required certification shall be subject to a civil penalty of not less than $10,000 and not more than $100,000 for each such failure.

APPENDIX G

DISCOVERY PROGRAM PLANNING BUDGET PROFILE

The Discovery Program funding profile for future missions is subject to a wide variety of pressures. For planning purposes, the five (5) year forecast of NASA funding for mission number nine is provided in the table below (in Real Year Million Dollars). These levels represent the highest level acceptable for the years FY 2001-2002, but unused portions of earlier funds can be used in the next year if necessary. In addition, these levels represent the total available to Discovery missions for all costs to NASA, including launch vehicle costs as provided in Discovery Launch Services Information Summary document located in the Discovery Program Library (see Appendix E).

	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005
Total	$53	$47	$100	$69	$30

The NASA forecast for specific budgets beyond the year 2005 are not yet available. The NASA budget for years beyond the year 2005 should be sufficient to cover any funding requirements necessary for missions proposed to this AO. Consequently, Discovery missions do not need to consider yearly funding limitations for FY 2006 and out.